Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

SEP 26 2002

Docket No. 50-336
B18763

RE: 10 CFR 50.67
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Power Station, Unit No. 2
License Basis Document Change Request (LBDCR) 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses

Introduction

Pursuant to 10 CFR 50.67 and 10 CFR 50.90, Dominion Nuclear Connecticut, Inc. (DNC), hereby proposes to amend Operating License DPR-65 by incorporating the attached proposed changes. DNC requests Nuclear Regulatory Commission (NRC) approval of a re-analysis of the Millstone Unit No. 2 limiting design basis Fuel Handling Accidents using a selective implementation of the Alternative Source Term methodology in accordance with 10 CFR 50.67 and Regulatory Guide 1.183.(1)

Consistent with the re-analysis of the Fuel Handling Accidents, DNC is proposing to change Millstone Unit No. 2 Technical Specification 3.3.3.1, "Monitoring Instrumentation, Radiation Monitoring," Technical Specification 3.3.4, "Instrumentation, Containment Purge Valve Isolation Signal," Technical Specification 3.7.6.1, "Plant Systems, Control Room Emergency Ventilation System," Technical Specification 3.9.4, "Refueling Operations, Containment Penetrations," Technical Specification 3.9.8.1, "Refueling Operations, Shutdown Cooling and Coolant Circulation - High Water Level," Technical Specification 3.9.8.2, "Refueling Operations, Shutdown Cooling and Coolant Circulation - Low Water Level," and Technical Specification 3.9.15, "Refueling Operations, Storage Pool Area Ventilation System." Index page IX will also be changed. The Bases for these Technical Specifications will be modified to reflect these changes as applicable.

A001

(1) U.S. NRC Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design-Basis Accidents at Nuclear Power Plants," issued July 2000.

Attachment 1 provides a discussion of the analyses of the Fuel Handling Accidents. Attachment 2 provides a discussion of the proposed Technical Specifications changes and the Safety Summary. Attachment 3 provides the Significant Hazards Consideration. Attachment 4 provides the marked-up version of the appropriate pages of the current Technical Specifications. Attachment 5 provides the retyped pages of the Technical Specifications. Attachment 6 provides an informational copy of the proposed Final Safety Analysis Report changes for the re-analyses of the Fuel Handling Accidents.

Environmental Considerations

DNC has evaluated the proposed changes against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.22. DNC has determined that the proposed changes meet the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and as such, has determined that no irreversible consequences exist in accordance with 10 CFR 50.92(b). This determination is based on the fact that the changes are being proposed as an amendment to a license issued pursuant to 10 CFR 50 that changes a requirement with respect to use of a facility component located within the restricted area, as defined by 10 CFR 20, or that changes a surveillance requirement, and that the amendment request meets the following specific criteria.

(i) The proposed changes involve no Significant Hazards Consideration.

As demonstrated in Attachment 3, the proposed changes do not involve a Significant Hazards Consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released off-site.

The proposed changes will revise the design basis Fuel Handling Accident Analyses consistent with the Alternative Source Term Methodology of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183, as well as revise the facility Technical Specifications consistent with the new Fuel Handling Accident Analyses. The proposed changes do not involve physical modifications to plant equipment. The proposed changes are consistent with the design basis of the plant. The proposed changes will not result in an increase in power level, will not increase the production of radioactive waste and byproducts, and will not alter the flowpath or method of disposal of radioactive waste or byproducts. Therefore, the proposed changes will not increase the type and amounts of effluents that may be released off-site.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed changes will not result in changes in the configuration of the facility. There will be no change in the level of controls or methodology used for processing radioactive effluents or the handling of solid radioactive waste. There will be no change to the normal radiation levels within the plant. Therefore, there will be no increase in individual or cumulative occupational radiation exposure resulting from the proposed changes.

Conclusions

The proposed changes were evaluated and we have concluded that they are safe. The proposed changes do not involve an adverse impact on public health and safety (see the Safety Summary provided in Attachment 2) and do not involve a Significant Hazards Consideration pursuant to the provisions of 10 CFR 50.92 (see the Significant Hazards Consideration provided in Attachment 3).

Site Operations Review Committee and Management Safety Review Committee

The Site Operations Review Committee and Management Safety Review Committee have reviewed and concurred with the determinations.

Schedule

DNC request approval and issuance of this amendment by July 31, 2003 to support use of the new requirements during Refueling Outage 15, currently scheduled in October 2003, with the amendment to be implemented within 90 days of issuance.

State Notification

In accordance with 10 CFR 50.91(b), a copy of this License Amendment Request is being provided to the State of Connecticut.

There are no regulatory commitments contained in this letter.

If you should have any questions on the above, please contact Mr. Ravi Joshi at (860) 440-2080.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

J. Alan Price
Site Vice President - Millstone

Sworn to and subscribed before me

this 26th day of September, 2002

Elena L. Lockett
Notary Public

My Commission expires June 30, 2005

ELENA L. LOCKETT
NOTARY PUBLIC
COMMISSION EXPIRES
JUNE 30, 2005

Attachments (6)

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
NRC Senior Resident Inspector, Millstone Unit No. 2

Director
Bureau of Air Management
Monitoring and Radiation Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Attachment 1

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Discussion of Fuel Handling Accident Analyses

License Basis Document Change Request (LBDCR) 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Discussion of Fuel Handling Accident Analyses

Pursuant to 10 CFR 50.67 Dominion Nuclear Connecticut, Inc. (DNC), hereby proposes to amend Operating License DPR-65. DNC requests Nuclear Regulatory Commission (NRC) approval of a re-analysis of the Millstone Unit No. 2 limiting design basis Fuel Handling Accidents (FHAs) using a selective implementation of the Alternative Source Term (AST) methodology in accordance with 10 CFR 50.67 and Regulatory Guide 1.183.(1) DNC is proposing to revise the Millstone Unit No. 2 analyses of the FHA inside Containment, the FHA in the Spent Fuel Pool Area, and the Spent Fuel Cask Drop Accident in the Spent Fuel Pool Area using an AST methodology. A brief description of the events addressed by the FHA Analyses, the mitigation methods assumed, and the consequences of the accidents will be presented.

Current Design and Licensing Basis

Millstone Unit No. 2 current licensing basis for the FHA Analyses is presented in Chapter 14 of the Millstone Unit No. 2 Final Safety Analysis Report (FSAR), Section 14.7.4 and 14.7.5. The FHA Analyses are based on the methodologies and assumptions derived from Regulatory Guide 1.25, Standard Review Plan (SRP) 15.7.4, and SRP 15.7.5. The FHA Analyses are also consistent with the guidance of TID-14844.(2)

FHA Inside Containment

The current FHA Inside Containment Analysis allows the Containment Purge System to be operated to provide fresh air to Containment during fuel handling operations inside Containment. The Containment purge supply and exhaust air plenums each contain two 48 inch butterfly valves. The exhaust air flow, which is maintained greater than the supply flow to ensure leakage is into Containment, is directed to the Millstone Unit No. 2 stack for release to the environment. Upon detection of a high radioactivity level inside Containment by the Containment gaseous and particulate radiation monitors, a Containment purge valve isolation signal is generated. A high radioactivity level sensed by any one of the four Containment radiation monitors will result in a closure signal to the Containment purge supply and exhaust valves. If this automatic Containment purge valve isolation capability is not available, the Containment purge valves must be maintained closed during core alterations and irradiated fuel movement inside Containment. If Containment purge is in operation, the release to the environment

(1) Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July 1, 2000.

(2) J.J. Di Nunno, et. Al., "Calculation of Distance Factors for Power and Test Reactor Sites," U.S. AEC TID-14844, U.S. Atomic Energy Commission (now U.S. NRC), 1962.

following a FHA inside Containment, is assumed to continue for 10 minutes. After 10 minutes, Containment purge will be secured and Containment isolated.

The current FHA Inside Containment Analysis also assumes that both Containment personnel airlock doors are open during fuel movement. The Containment personnel airlock doors are controlled administratively to ensure at least one door is closed within 10 minutes. In addition, Containment purge must be in operation for both airlock doors to be open, to ensure airflow through the open airlock doors is into Containment. The radioactivity released from Containment to the environment may be drawn into the Millstone Unit No. 2 Control Room by the Control Room Emergency Ventilation System (CREV). The radiation monitors in the supply plenum will sense the high radioactivity and initiate isolation of the control room from outside air, if necessary.

Millstone Unit No. 2 FSAR Table 14.7.4-2 provides the major assumptions associated with the FHA Inside Containment. The radiological consequences of the FHA Inside Containment are summarized in Table 1.

Table 1
Summary of Current Doses for a FHA Inside Containment

Location	Thyroid (rem)	Whole Body (rem)	Beta Skin (rem)
EAB	3.53E+01	1.23E-01	N/A
LPZ	4.63E+00	1.61E-02	N/A
Millstone Unit No. 2 Control Room	2.58E+01	3.94E-02	1.32E+00

The radiological consequences of a FHA Inside Containment at Millstone Unit No. 2 are well within the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) dose limits of 10 CFR 100 (300 rem thyroid and 25 rem whole body). "Well within" is defined by Standard Review Plan (SRP) 15.7.4 as 25% or less of the 10 CFR 100 limits. The dose to the control room operators is within the 10 CFR 50, Appendix A, General Design Criterion (GDC) 19 limit of 5 rem whole body or its equivalent (30 rem thyroid and 30 rem to the skin as defined by SRP 6.4).

The TACTIII computer code was used to calculate the thyroid and whole body dose to the EAB and LPZ. The CRADLE computer code was used to calculate the thyroid, whole body and beta skin dose to the Millstone Unit No. 2 Control Room. The assumptions of Standard Review Plan 15.7.4 were used in this analysis.

FHA Inside the Spent Fuel Pool Area

The Fuel Handling Ventilation System supplies tempered air from the heating and ventilating unit to the fuel handling area. The air is exhausted through return registers located above the Spent Fuel Pool by the Main Exhaust System. The exhaust air is filtered through fuel handling high efficiency particulate (HEPA) filters prior to discharge through the Millstone Unit No. 2 stack. The Fuel Handling Building is maintained under a slight negative pressure to ensure leakage is into the fuel handling area.

The exhaust air is automatically diverted from the Main Exhaust System to the Enclosure Building Filtration System (EBFS) when an Auxiliary Exhaust Actuation Signal (AEAS) is generated. An AEAS will occur when high radiation is sensed by at least 2 of the 4 Spent Fuel Pool area radiation monitors. However, automatic actuation is not assumed in the analysis of a FHA in the Spent Fuel Pool Area.

Prior to the movement of irradiated fuel that has decayed in the Spent Fuel Pool for less than 60 days, exhaust air is diverted from the Main Exhaust System to the EBFS operating in the auxiliary exhaust mode by manual alignment of the system. The exhaust air diversion is necessary to ensure that in the event of a FHA in the Spent Fuel Pool area, the EBFS will be operating in the auxiliary exhaust mode 1) to maintain a negative pressure within the Fuel Handling Building and 2) to channel the radioactive gases released through HEPA filters and charcoal adsorbers prior to discharge through the Millstone Site stack.

Integrity of the fuel handling area is ensured by verifying various Auxiliary Building doors are closed prior to fuel movement over or in the Spent Fuel Pool, when irradiated fuel that has decayed less than 60 days is in the Spent Fuel Pool. It is also necessary to ensure no openings exist in the fuel handling area boundary that could affect area integrity. However, normal entry and egress through the Spent Fuel Pool area access doors during fuel and shielded cask movement is permitted. This will not significantly affect the operation of the EBFS in the auxiliary exhaust mode because leakage into the Spent Fuel Pool area from outside the fuel handling area boundary should still occur, resulting in filtration before release to the environment. In addition, the access openings will only be open for short periods of time.

The current analysis for a FHA in the Spent Fuel Pool area assumes the exhaust air is diverted from the Main Exhaust System to the EBFS by manual alignment of the system, prior to initiating irradiated fuel movement. Thus, there is no response time for transfer of the Fuel Handling Ventilation System to the EBFS operating in the auxiliary exhaust mode of operation and the radioactive material released from the irradiated fuel assemblies is filtered by HEPA filters and charcoal adsorbers before release to the environment via the Millstone Site stack. A small amount of leakage (2%) will bypass the normal ventilation flowpath and will be an unfiltered release to the environment. This 2% bypass flow allows use of the Auxiliary Building elevator during irradiated fuel movement in the Spent Fuel Pool area.

The current FHA Inside the Spent Fuel Pool Area Analysis assumes that irradiated fuel that has decayed less than 60 days is located in the Spent Fuel Pool. This analysis assumes that the CREV System is operable for all fuel movement in the Spent Fuel

Pool area. The Millstone Unit No. 2 Control Room is isolated by the control room inlet radiation monitors.

The TACTIII computer code was used to calculate the thyroid and whole body dose to the EAB and LPZ. The CRADLE computer code was used to calculate the thyroid, whole body and beta skin dose to the Millstone Unit No. 2 Control Room. The assumptions of Standard Review Plan 15.7.4 were used in this analysis.

Millstone Unit No. 2 FSAR Table 14.7.4-1 provides the major assumptions associated with the FHA in the Spent Fuel Pool Area. The radiological consequences of the FHA in the Spent Fuel Pool Area are summarized in Table 2.

Table 2
Summary of Current Doses for a FHA in the Spent Fuel Pool Area

Location	Thyroid (rem)	Whole Body (rem)	Beta Skin (rem)
EAB	5.13E+00	9.22E-02	N/A
LPZ	1.15E+00	2.39E-02	N/A
Millstone Unit No. 2 Control Room	1.96E+01	7.33E-02	2.27E+00

The radiological consequences of a FHA Inside the Spent Fuel Pool Area at Millstone Unit No. 2 are well within the EAB and LPZ dose limits of 10 CFR 100 (300 rem thyroid and 25 rem whole body). "Well within" is defined by SRP 15.7.4 as 25% or less of the 10 CFR 100 limits. The dose to the control room operators is within the 10 CFR 50, Appendix A, GDC 19 limit of 5 rem whole body or its equivalent (30 rem thyroid and 30 rem to the skin as defined by SRP 6.4).

<u>FHA Inside the Spent Fuel Pool Area with 60 Day Decay</u>

If all of the irradiated fuel in the Spent Fuel Pool has decayed at least 60 days, it is not necessary for the exhaust air to be diverted from the Main Exhaust System to the EBFS operating in the auxiliary exhaust mode. This has been verified by the performance of an additional analysis case that assumes at least 60 days decay, with a normal ventilation flowpath through the Spent Fuel Pool area. This analysis does not assume that the CREV System is operable for all fuel movement in the Spent Fuel Pool area.

The TACTIII computer code was used to calculate the thyroid and whole body dose to the EAB and LPZ. The CRADLE computer code was used to calculate the thyroid, whole body and beta skin dose to the Millstone Unit No. 2 Control Room. Millstone Unit No. 2 FSAR Table 14.7.4-3 provides the major assumptions associated with the FHA in the Spent Fuel Pool Area with irradiated fuel decayed at least 60 days. The assumptions of SRP 15.7.4 were used in this analysis. The radiological consequences of the FHA in the Spent Fuel Pool With 60 Day Decay are summarized in Table 3.

Table 3
Summary of Current Doses for a FHA in the Spent Fuel Pool With 60 Day Decay

Location	Thyroid (rem)	Whole Body (rem)	Beta Skin (rem)
EAB	6.06E-01	8.96E-04	N/A
LPZ	7.95E-02	1.18E-04	N/A
Millstone Unit No. 2 Control Room	9.01E+00	7.23E-04	7.00E-01

The radiological consequences of a FHA Inside the Spent Fuel Pool Area With 60 Day Decay at Millstone Unit No. 2 are well within the EAB and LPZ dose limits of 10 CFR 100 (300 rem thyroid and 25 rem whole body). "Well within" is defined by SRP 15.7.4 as 25% or less of the 10 CFR 100 limits. The dose to the control room operators is within the 10 CFR 50, Appendix A, GDC 19 limit of 5 rem whole body or its equivalent (30 rem thyroid and 30 rem to the skin as defined by SRP 6.4).

<u>Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area</u>

Prior to shielded cask movement in the Spent Fuel Pool, exhaust air is diverted from the Main Exhaust System to the EBFS operating in the auxiliary exhaust mode by manual alignment of the system. This is necessary to ensure that in the event a spent fuel cask (a shielded cask) is dropped in the Spent Fuel Pool area, the EBFS will be operating in the auxiliary exhaust mode to maintain a negative pressure within the Fuel Handling Building and to channel the radioactive gases released through HEPA filters and charcoal adsorbers.

The current analysis of a spent fuel cask drop inside the Spent Fuel Pool area assumes all radioactive material released from the irradiated fuel assemblies (damaged by the dropped cask) will be filtered by HEPA filters and charcoal adsorbers before release to the environment via the Millstone Site stack. A small amount of leakage (2%) will bypass the normal ventilation flowpath and will be an unfiltered release to the environment. This 2% bypass flow allows use of the Auxiliary Building elevator during cask movement in the Spent Fuel Pool area.

The TACTIII computer code was used to calculate the thyroid and whole body dose to the EAB and LPZ. The CRADLE computer code was used to calculate the whole body and beta skin dose to the Millstone Unit No. 2 Control Room. A manual calculation was performed to calculate the thyroid dose from I-129. The assumptions of SRP 15.7.5 were used in this analysis. Millstone Unit No. 2 FSAR Section 14.7.5 discusses the major assumptions associated with the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area. The radiological consequences of the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area are summarized in Table 4.

Table 4
Summary of Current Doses for a Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area

Location	Thyroid (rem)	Whole Body (rem)	Beta Skin (rem)
EAB	1.62E-03	1.26E-01	N/A
LPZ	3.62E-04	3.27E-02	N/A
Millstone Unit No. 2 Control Room	4.75E-01	3.25E-01	2.51E+01

The radiological consequences of a Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area at Millstone Unit No. 2 are well within the EAB and LPZ dose limits of 10 CFR 100 (300 rem thyroid and 25 rem whole body). "Well within" is defined by SRP 15.7.4 as 25% or less of the 10 CFR 100 limits. The dose to the control room operators is within the 10 CFR 50, Appendix A, GDC 19 limit of 5 rem whole body or its equivalent (30 rem thyroid and 30 rem to the skin as defined by SRP 6.4).

Proposed Design and Licensing Basis - Alternative Source Term Methodology

10 CFR 50.67 allows licensees to revise the current source term used in the radiological analyses using the guidance provided in Regulatory Guide 1.183. The revised, or AST FHA Analyses, are consistent with 10 CFR 50.67 and the guidance provided in Regulatory Guide 1.183.

A. Discussion of the Proposed Design and Licensing Basis

<u>FHA Inside Containment</u>

The equipment door, personnel air lock door and other penetrations are assumed to be open for the duration of the FHA Inside Containment radiological release. Containment purge is not credited to be operating. If Containment purge is operating, it is not assumed to automatically isolate in the event of a FHA. Although the revised, or AST analysis, of the FHA Inside Containment assumes a 2 hour release, DNC will establish administrative controls such that any Containment penetration which provides direct access to the outside atmosphere, including the equipment door and personnel airlock door, can be closed within 30 minutes of a FHA, as recommended by the guidance of Regulatory Guide 1.183. The Containment atmosphere boundary is defined as any penetration which provides direct access to the outside atmosphere.

Integrity of the Containment atmosphere boundary is established when at least one barrier between the Containment atmosphere and the outside atmosphere is established. These administrative controls are further discussed in the proposed changes to Technical Specification 3.9.4 (see Attachment 2).

The current design basis FHA fuel failure analysis, performed by Siemens Power Corporation (now Framatone ANP, Inc.), shows that only 99 fuel rods within one fuel assembly would fail. However, one irradiated fuel assembly is conservatively assumed to be damaged in both the current and revised FHA Analyses. The depth of water above the damaged fuel assembly is at least 23 feet in accordance with Millstone Unit No. 2 Technical Specifications, therefore an effective decontamination factor of 200, which is allowed by Regulatory Guide 1.183, is used in the AST analysis. The release rate from the Containment is based on a turnover rate that essentially releases 100% of the available curies from the accident over a period of 2 hours.

The location of the release is assumed to be the Enclosure Building edge at ground level closest to the control room. The X/Q's to the EAB and LPZ remain the same irregardless of which penetration the release is from. The X/Q to the Millstone Unit No. 2 Control Room from the Enclosure Building edge at ground level closest to the control room is higher than any other potential release point. The X/Q's used for the FHA Inside Containment Analysis are consistent with the values used in applicable accident analyses for a Enclosure Building ground level release (see Millstone Unit No. 2 License Amendment No. 245[(3)]).

The computer code RADTRAD was used to calculate Total Effective Dose Equivalent (TEDE) to the EAB, LPZ and Millstone Unit No. 2 Control Room from a FHA Inside Containment. A conservative assumption, beyond that recommended in Regulatory Guide 1.183, was used for the fractions of noble gasses and iodines released from the irradiated fuel. The regulatory guide states that 5% of noble gases, other than Kr-85, and 5% of the halogens, other than I-131, are released from the gap. The Millstone Unit No. 2 FHA Inside Containment Analysis assumes all noble gases are released at the Kr-85 release fraction of 10% and all halogens are released at the I-131 release fraction of 8%.

The Millstone Unit No. 2 current design basis source term is based on extended burnup fuel consistent with the current FHA Analyses (see Millstone Unit No. 2 License Amendment No. 245). Since only noble gases and halogens are released into the atmosphere during a FHA, a new source term calculation for the other nuclide groups defined in Regulatory Guide 1.183 was not required.

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(3) Jacob I. Zimmerman, U.S. NRC to S. E. Scace, "Millstone Nuclear Power Station, Unit No. 2 - Issuance of Amendment Re: Fuel Handling and Cask Drop Accident, Amendment No. 245, TAC No. MA7712)," dated April 28, 2000.

Other conservative assumptions used in the AST analysis include:

- 72 hour decayed fuel instead of the current 150 hour decay.
- Control room isolates within 20 seconds from the control room inlet radiation monitors. The current analysis assumes that the control room isolates within 10 seconds.
- Control room unfiltered inleakage rate of 200 standard cubic feet per minute (scfm) instead of the Technical Specification limit of 130 scfm.
- Control room charcoal bed efficiency of 70% for all forms of iodine versus a design basis value of 90%.
- Time to place the control room on filtered recirculation is assumed to be 1 hour versus the current assumption of 10 minutes.

Table 5 provides a comparison of the assumptions made between the current analysis and the AST analysis.

Table 5
Comparison of the Current FHA Inside Containment
Analysis to the AST Analysis

Assumption	Current Value	AST Value
Halogen release fraction	12%	8%
Noble gas release fraction	10% (Kr-85 30%)	10%
Effective Elemental iodine form	75%	57%
Effective Organic iodine form	25%	43%
Decontamination factor	100	200
Fuel damage	1 assembly	1 assembly
Fuel decay time	150 hours	72 hours
Peaking factor	1.83	1.83
Release point	Millstone Unit No. 2 vent	Enclosure Building edge
EAB X/Q (sec/m^3)	3.66E-4	3.66E-4
LPZ X/Q (sec/m^3)	4.80E-5	4.80E-5
Control room X/Q (sec/m^3)	2.92E-3	5.46E-3
Offsite breathing rate (m^3/sec)	3.47E-4	3.5E-4
Time of release	10 minutes	2 hours

Assumption	Current Value	AST Value
Dose conversion factors	ICRP 30 & Reg. Guide 1.109	FGR 11 and 12
Control room volume (ft^3)	35,650	35,650
Control room isolation	10 seconds	20 seconds
Flow before isolation (scfm)	800	800
Recirculation rate (scfm)	2,250	2,250
Time to start recirculation	10 minutes	1 hour
Charcoal efficiency	90%	70%
Unfiltered inleakage (scfm)	130	200

Table 6 lists the results of the AST analysis. All doses are less than those specified in 10 CFR 50.67 and Regulatory Guide 1.183.

Table 6
FHA Inside Containment AST
Analysis Results

Dose Location	TEDE Results	TEDE Limit
EAB	1.2E+00	6.3
LPZ	1.5E-01	6.3
Millstone Unit No. 2 Control Room	4.6E+00	5.0

There are no actual design changes associated with implementation of the FHA Analyses. DNC will maintain the same controls for monitoring radioactivity within Containment. Local area radiation monitors, effluent discharge monitors, and Containment gaseous and particulate radiation monitors, provide a defense-in-depth in monitoring Containment atmosphere and identifying the need for establishing the Containment atmosphere boundary.

The Millstone Unit No. 2 stack gaseous and particulate monitoring systems continue to monitor any releases from normal or accident conditions. Health Physics practices and the Millstone Station Effluent Control Program monitor discharge paths and areas within the plant in which increases in radioactivity could occur when normal monitoring equipment is not available.

Although the Millstone Unit No. 2 response to General Design Criterion 64 states that the Containment monitors monitor the Containment atmosphere, if they were to fail or were unavailable, grab samples are taken or portable continuous air monitoring equipment is used. Millstone Unit No. 2 will continue to use this approach to monitoring Containment airborne radioactivity levels. Therefore, the proposed changes associated with the revised FHA Analyses are consistent with the existing Millstone Unit No. 2 Health Physics practices and the station effluent control program, and continue to satisfy the requirements of GDC 64.

FHA Inside the Spent Fuel Pool Area

The AST analysis for the FHA Inside the Spent Fuel Pool Area does not distinguish between fuel which has decayed for either more than 60 days or which has decayed less than 60 days. The analysis does not assume that Spent Fuel Pool area atmosphere boundary integrity is maintained while moving spent fuel. The AES, which diverts air through the EBFS to the Millstone Site stack, is not credited to be operating. Spent Fuel Pool area normal ventilation, which exhausts to the Millstone Unit No. 2 vent, is not credited to be operating. The Spent Fuel Pool area radiation monitors are not credited to automatically start the AES. Although the analysis assumes a 2 hour unrestricted release, procedural guidance will be implemented for closing Spent Fuel Pool area atmosphere boundary penetrations if a FHA occurs inside the Spent Fuel Pool area. The Spent Fuel Pool area atmosphere boundary is defined as any penetration which provides direct access to the outside atmosphere.

The current design basis FHA fuel failure analysis, performed by Siemens Power Corporation (now Framatone ANP, Inc.), shows that only 99 fuel rods within one fuel assembly would fail. However, one irradiated fuel assembly is conservatively assumed to be damaged in both the current and revised FHA Analyses. However, the depth of the water above the damaged fuel is assumed to be at least 23 feet, as required by the Millstone Unit No. 2 Technical Specifications. Consistent with this requirement, an effective decontamination factor of 200 is used in the analysis, as allowed by Regulatory Guide 1.183. The release rate from the Spent Fuel Pool area is based on a turnover rate that essentially releases 100% of the available curies from the accident over a period of 2 hours.

The computer code RADTRAD was used to calculate TEDE to the EAB, LPZ and Millstone Unit No. 2 Control Room from a FHA inside the Spent Fuel Pool area. A conservative assumption beyond that recommended in Regulatory Guide 1.183 was used for the fractions of noble gasses and iodines released from the damaged fuel. The regulatory guide states that 5% of noble gases, other than Kr-85, and 5% of the halogens, other than I-131, are released from the gap. The Millstone Unit No. 2 FHA Inside the Spent Fuel Pool Area Analysis assumes all noble gases are released at the Kr-85 release fraction of 10% and all halogens are released at the I-131 release fraction of 8%.

The location of the release is assumed to be the Enclosure Building edge at ground level closest to the control room. The X/Q's to the EAB and LPZ remain the same if the release is from any open door, area leakage or the Millstone Unit No. 2 vent. If AES is in operation the X/Q's are lower. The X/Q to the Millstone Unit No. 2 Control Room from the Enclosure Building edge at ground level closest to the control room is higher than any other potential release point. The X/Q's used for the FHA Inside the Spent Fuel Pool Area are consistent with the X/Q's used in the current FHA in the Spent Fuel Pool With 60 Day Decay Analysis. This number was used since Spent Fuel Pool Area ventilation is no longer credited with operation if a FHA occurs, and is conservative with respect to the current FHA Inside the Spent Fuel Pool Area Analysis.

The Millstone Unit No. 2 current design basis source term is based on extended burnup fuel consistent with the current accident analyses. Since only noble gases and halogens are released from the water into the atmosphere during a FHA, a new source term calculation for the other nuclide groups defined in Regulatory Guide 1.183 was not required.

Other conservative assumptions used in this analysis include:

- Control room isolates within 20 seconds from the control room inlet radiation monitors. Current analysis and tests show the control room isolates within 10 seconds.
- Control room unfiltered inleakage rate of 200 scfm instead of the Technical Specification limit of 130 scfm.
- Control room charcoal bed efficiency of 70% for all forms of iodine versus 90%.
- Time to place the control room on recirculation is assumed to be 1 hour versus the current assumption of 10 minutes.

Table 7 lists a comparison of the assumptions made between the current analysis and the AST analysis.

Table 7
Comparison of the Current FHA Inside the Spent Fuel Pool Area Analysis to the AST Analysis

Assumption	Current Value	AST Value
Halogen release fraction	12%	8%
Noble gas release fraction	10% (Kr-85 30%)	10%
Effective Elemental iodine form	75%	57%

Assumption	Current Value	AST Value
Effective Organic iodine form	25%	43%
Decontamination factor	100	200
Fuel damage	1 assembly	1 assembly
Fuel decay time	72 hours	72 hours
Peaking factor	1.83	1.83
Release point	Millstone Site stack and Enclosure Building edge	Enclosure Building edge
EAB X/Q (sec/m^3)	1.00E-4 & 3.66E-4	3.66E-4
LPZ X/Q (sec/m^3)	2.69E-5 & 4.80E-5	4.80E-5
Control room X/Q (sec/m^3)	2.51E-4 & 5.46E-3	5.46E-3
Offsite breathing rate (m^3/sec)	3.47E-4	3.5E-4
Time of release	2 hours	2 hours
Dose conversion factors	ICRP 30 & Regulatory Guide 1.109	FGR 11 and 12
Control room volume (ft^3)	35,650	35,650
Control room isolation	10 seconds	20 seconds
Flow before isolation (scfm)	800	800
Recirculation rate (scfm)	2,250	2,250
Time to start recirculation	10 minutes	1 hour
Charcoal efficiency	90%	70%
Unfiltered inleakage(scfm)	130	200

Table 8 lists the results of the AST analysis. All doses are less than those specified in 10 CFR 50.67 and Regulatory Guide 1.183.

Table 8
FHA Inside the Spent Fuel Pool Area
AST Analysis Results

Dose Location	TEDE Results	TEDE Limit
EAB	1.2E+00	6.3
LPZ	1.5E-01	6.3
Millstone Unit No. 2 Control Room	4.6E+00	5.0

Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area

The AST analysis for the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area does not credit Spent Fuel Pool area atmosphere boundary integrity. The AES, which diverts air through the EBFS to the Millstone Site stack, is not credited to be operating or capable of operating. Spent fuel pool area normal ventilation, which exhausts to the Millstone Unit No. 2 vent, is not credited to be operating or capable of operating. The Spent Fuel Pool area radiation monitors are not credited to automatically start the AES. For the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area, the control room inlet radiation monitors are not credited to automatically isolate the control room to maximize potential dose consequences from this event. Control room isolation is not assumed for the Spent Fuel Cask Drop Accident Analysis. Control room isolation will result in a higher TEDE, however, the TEDE will be within the 10 CFR 50.67 and Regulatory Guide 1.183 limits.

The location of the release is assumed to be the Enclosure Building edge at ground level closest to the control room. The X/Q's to the EAB and LPZ remain the same if the release is from any open door, area leakage or the Millstone Unit No. 2 vent. If AES is in operation the X/Q's are lower. The X/Q to the Millstone Unit No. 2 Control Room from the Enclosure Building edge at ground level closest to the control room is higher than any other potential release point.

The Millstone Unit No. 2 current design basis source term is based on extended burnup fuel consistent with the current accident analysis. Since in a spent fuel cask drop accident only noble gases and halogens are released from the water into the Spent Fuel Pool area atmosphere, a new source term calculation for the other nuclide groups defined in Regulatory Guide 1.183 was not required.

All spent fuel assemblies within 'L' distance from the center of the cask laydown area must be decayed at least one (1) year. Due to this decay, essentially only Kr-85 and I-129 are available for release. As listed in Regulatory Guide 1.183, 10% of Kr-85 and 5% of I-129 are assumed to be released from the gap.

184 fuel assemblies decayed for one (1) year and 1376 fuel assemblies decayed for five (5) years are assumed to be damaged as a result of a cask drop accident in the Spent Fuel Pool area. However, the depth of the water above the damaged fuel is assumed to be at least 23 feet, as required by the Millstone Unit No. 2 Technical Specifications. Consistent with this requirement, an effective decontamination factor of 200 is used in the analysis, as allowed by Regulatory Guide 1.183. The release rate from the Spent Fuel Pool area is based on a turnover rate that essentially releases 100% of the available curies over a period of 2 hours.

The computer code RADTRAD was used to calculate the TEDE dose to the EAB, LPZ and Millstone Unit No. 2 Control Room from a cask drop accident in the Spent Fuel Pool area. The assumptions for a FHA in Regulatory Guide 1.183 were used in the analysis.

Table 9 lists a comparison of the assumptions made between the current analysis and the AST analysis.

Table 9
Comparison of the Current Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area Analysis to the AST Analysis

Assumption	**Current Value**	**AST Value**
Kr-85 release fraction	30%	10%
I-129 release fraction	10%	5%
Effective Elemental iodine form	75%	57%
Effective Organic iodine form	25%	43%
Decontamination factor	100	200
Fuel damage	1560 assemblies	1560 assemblies
Fuel decay time	1 - 5 years	1 - 5 years
Release point	Millstone Site stack and Millstone Unit No. 2 vent	Enclosure Building edge
EAB X/Q (sec/m^3)	1.00E-4 & 3.66E-4	3.66E-4
LPZ X/Q (sec/m^3)	2.69E-5 & 4.80E-5	4.80E-5
Control Room X/Q (sec/m^3)	2.51E-4 & 2.92E-3	5.46E-3
Offsite breathing rate (m^3/sec)	3.47E-4	3.5E-4
Time of release	2 hours	2 hours
Dose conversion factors	ICRP 30 & Regulatory Guide 1.109	FGR 11 and 12
Control room volume (ft^3)	35,650	35,650
Control room inlet flow (scfm)	800	800

Table 10 lists the results of the AST analysis. All doses are less than those specified in 10 CFR 50.67 and Regulatory Guide 1.183.

Table 10
Spent Fuel Cask Drop Accident Inside the
Spent Fuel Pool Area AST Analysis Results

Dose Location	TEDE Results	TEDE Limit
EAB	1.1E-01	6.3
LPZ	1.4E-02	6.3
Millstone Unit No. 2 Control Room	5.0E-02	5.0

B. Accident Source Term

1. Fission Product Inventory

The core inventory was determined using ORIGEN2, and is Millstone Unit No. 2 specific. A range of enrichments and extended fuel burnups consistent with the fuel used at Millstone Unit No. 2 was evaluated to determine bounding core inventory levels. A power level of 2700 Mega-Watts thermal (plus 2% uncertainty) was assumed. The fission product inventory assumed is consistent with the value used in the current analyses.

Xenons, kryptons and halogens are assumed to be released from the Spent Fuel Pool into the Spent Fuel Pool area atmosphere consistent with Regulatory Guide 1.183. No adjustment to the fission product inventory was made for events postulated to occur during power operations at less than full rated power or for those events postulated to occur at the beginning of core life.

2. Release Fractions

The release fractions for the FHA are based on Regulatory Guide 1.183, Table 3. Table 3 lists the fraction of fission product inventory in the gap as 8% I-131, 10% Kr-85, 5% other noble gasses and 5% other halogens. The Millstone Unit No. 2 FHA conservatively assumes that 8% of all halogens and 10% of all noble gasses are released from the gap.

Due to the long decay times (1 to 5 years) associated with irradiated fuel damaged in a cask drop accident, only I-129 and Kr-85 are assumed to be released. Therefore the Regulatory Guide 1.183 assumptions of 10% Kr-85 and 5% I-129 release fractions are used.

3. Timing of Release phases

The analysis assumes all the gap activity in the damaged rods is instantaneously released into the Containment or Spent Fuel Pool area. Essentially 100% of the radioactive material is then assumed to escape from the Spent Fuel Pool area or Containment to the outside atmosphere over a two (2) hour period.

4. Radionuclide Composition

The radionuclide composition consists of xenons, kryptons and halogens.

5. Chemical Form

The chemical form of the iodines released from the fuel is 95% cesium iodide, 4.85% elemental iodine, and 0.15% organic iodide. The depth of the water above the damaged fuel is 23 feet or greater. Therefore, the decontamination factors for the elemental and organic species are 500 and 1, respectively, giving an overall effective decontamination factor of 200. This difference in decontamination factors results in the iodine above the water being composed of 57% elemental and 43% organic species.

6. Fuel Damage in Non-LOCA Design Basis Accidents

The amount of fuel damage assumed in a FHA in the Containment or Spent Fuel Pool area has been previously approved and has not changed. The current design basis FHA fuel failure analysis, performed by Siemens Power Corporation (now Framatone ANP, Inc.), shows that only 99 fuel rods within one fuel assembly would fail. However, the amount of fuel damage assumed in both the current and the revised FHA Analyses for a FHA inside Containment or in the Spent Fuel Pool area, is conservatively assumed to be one (1) assembly (see Millstone Unit No. 2 FSAR Section 14.7.4.2).

The FHA Analyses assume an irradiated fuel assembly drops 19 feet to the refuel pool or Spent Fuel Pool floor. The fuel assembly strikes the floor in a vertical position. After striking the floor vertically, the assembly rotates to a horizontal attitude. It is postulated that, during this rotation, the assembly will strike a protruding structure in the horizontal position.

The amount of fuel damaged in a cask drop accident has been previously approved and has not changed. It is assumed that 1,560 assemblies are damaged in the cask drop accident.

C. Dose Calculational Methodology

1. Offsite Dose Consequences

The TEDE consequences from a FHA in the spent fuel pool area or Containment to the EAB is 1.2 rem and to the LPZ is 0.15 rem. These consequences are less than the TEDE limit of 6.3 rem.

The TEDE consequences from a spent fuel cask drop accident in the Spent Fuel Pool to the EAB is 0.11 rem and to the LPZ is 0.014 rem. These consequences are less than the TEDE limit of 6.3 rem.

The maximum two-hour period for the EAB TEDE is from 0 - 2 hours.

2. Control Room Dose Consequences

The TEDE consequences from the FHA in the Spent Fuel Pool or Containment to the Millstone Unit No. 2 Control Room is 4.6 rem. These consequences are less than the TEDE limit of 5 rem.

The TEDE consequences from a spent fuel cask drop accident in the Spent Fuel Pool to the Millstone Unit No. 2 Control Room is 0.05 rem. These consequences are less than the TEDE limit of 5 rem.

3. Other Dose Consequences

All current Electrical Equipment Qualification (EEQ) and vital area access doses are based on the limiting LOCA accident since it provides the largest source term. Therefore the EEQ and vital area access doses remain unchanged for the AST FHA Analyses.

4. Acceptance Criteria

The AST acceptance criteria for the irradiated fuel handling and cask drop accidents are stated in Regulatory Guide 1.183 as 6.3 rem TEDE for the EAB and LPZ and 5 rem TEDE for the control room. Calculated doses for the irradiated fuel handling and cask drop accidents are less than the acceptance criteria.

D. Analysis Assumptions and Methodology

1. Analysis Quality

The irradiated fuel handling and cask drop accident analyses were analyzed using RADTRAD-NAI. Numerical Applications, Inc. (NAI) is the owner of RADTRAD-NAI. RADTRAD-NAI was completed under NAI's

Quality Assurance Plan which conforms to the requirements of 10 CFR 50, Appendix B.

2. Credit for Engineered Safeguard Features

With respect to the FHA inside Containment, no credit is taken for automatic purge valve isolation. Although the analysis assumes all the available radioactivity is released over a 2 hour period, administrative controls will be implemented to assure all open Containment penetrations that have direct access to the outside atmosphere are closed within 30 minutes following the accident. Penetrations include the equipment door, personnel air lock door, purge valves if open and any other physical penetrations. The control room is automatically isolated due to the control room inlet radiation monitors and is manually placed on filtered recirculation 1 hour after the FHA.

With respect to the FHA in the Spent Fuel Pool area, no credit is taken for the Spent Fuel Pool area radiation monitors to automatically start the AES which would discharge the release through the Enclosure Building Filtration System. The Spent Fuel Pool area radiation monitors are not credited for automatic isolation of the control room. No credit is taken for AES operation prior to moving fuel or after the accident. No credit is taken for Spent Fuel Pool area atmosphere boundary integrity. Although the analysis assumes all of the available radioactivity is released over a 2 hour period, procedural guidance will be implemented for closing Spent Fuel Pool area atmosphere boundary penetrations if a FHA occurs inside the Spent Fuel Pool area. The Spent Fuel Pool area atmosphere boundary is defined as any penetration which provides direct access to the outside atmosphere. Penetrations include Spent Fuel Pool area doors and ventilation (if in operation). The control room is automatically isolated due to the control room inlet radiation monitors and is manually placed on filtered recirculation 1 hour after the FHA.

With respect to the cask drop accident, no credit for engineered safeguard features is assumed. No credit for the operation of AES, either prior to or after the accident, is assumed. No credit for control room isolation is assumed.

3. Assignment of Numeric Input Values

The numeric input values are listed in Tables 5, 7 and 9 in the previous sections.

4. Applicability of Prior Licensing Basis

The prior licensing basis is listed in Tables 5, 7 and 9 in the previous sections.

5. Accident-Specific Assumptions

a. FHA Inside Containment

The assumptions used in the FHA Inside Containment Analyses are listed in Table 5 in the previous sections. They are consistent with the assumptions listed in Regulatory Guide 1.183.

b. FHA Inside the Spent Fuel Pool Area

The assumptions used in the FHA in the Spent Fuel Pool Area are listed in Table 7 in the previous sections. They are consistent with the assumptions listed in Regulatory Guide 1.183.

c. Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area

The assumptions used in the cask drop accident analysis are listed in Table 9 in the previous sections. They are consistent with the assumptions listed in Regulatory Guide 1.183 for a FHA.

6. Meteorology Assumptions

The X/Q's used in these analyses have been previously approved. Amendment number 245 contained the X/Q's to the EAB, LPZ and Millstone Unit No. 2 Control Room from ground level releases. These X/Q's used in the AST FHA Accident Analyses are based on the most conservative ground level, Enclosure Building edge release point.

E. Assumptions for Evaluating the Radiation Doses for Equipment Qualification

Assumptions and doses relating to the Equipment Qualification of Millstone Unit No. 2 components do not change with the AST Analyses. The LOCA remains the bounding accident with the exception of equipment in the Spent Fuel Pool. The current FHA analyses for the Spent Fuel Pool area assumes a higher fraction of halogens and Kr-85 are released from the irradiated fuel into the pool thereby bounding the new analysis. Therefore, for equipment in the Spent Fuel Pool area assumptions and results in the current analysis bound those in the AST Analyses.

Conclusion

An assessment of the radiological consequences due to a FHA inside Containment using the AST methodology concludes that the EAB, LPZ, and control room doses are within the limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183 without credit being taken for Containment atmosphere boundary integrity, i.e. closure of the equipment door, personnel air lock door, and other Containment atmosphere boundary penetrations is not assumed. The proposed administrative controls provide reasonable assurance that Containment atmosphere boundary integrity can quickly be established (within 30 minutes of a FHA inside Containment) as a defense-in-depth measure to limit actual releases to the outside atmosphere much lower than assumed in the AST FHA Analyses dose calculations.

An assessment of the radiological consequences due to a cask drop accident inside the Spent Fuel Pool area concludes that the radiological consequences of this accident are bounded by a FHA in the Spent Fuel Pool Area. An assessment of the radiological consequences due to a FHA in the Spent Fuel Pool Area using the AST methodology concludes that the EAB, LPZ, and control room doses are within the limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183 without credit being taken for Spent Fuel Pool area atmosphere integrity, i.e. closure of any Spent Fuel Pool area atmosphere boundary penetrations is not assumed. The proposed procedural guidance provides reasonable assurance that Spent Fuel Pool area atmosphere boundary integrity can be established as a defense-in-depth measure to limit actual releases to the outside atmosphere much lower than assumed in the AST FHA Analyses dose calculations.

In conclusion, there will be no adverse impact on the public health and safety.

Docket No. 50-336
B18763

Attachment 2

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Discussion of Proposed Changes and Safety Summary

License Basis Document Change Request (LBDCR) 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Discussion of Proposed Changes and Safety Summary

Introduction

Consistent with the reanalysis of the Fuel Handling Accidents (Attachment 1), Dominion Nuclear Connecticut, Inc. (DNC), hereby proposes to amend Operating License DPR-65 by incorporating the attached proposed changes into the Millstone Unit No. 2 Technical Specifications. DNC is proposing to change Technical Specification 3.3.3.1, "Monitoring Instrumentation, Radiation Monitoring," Technical Specification 3.3.4, "Instrumentation, Containment Purge Valve Isolation Signal," Technical Specification 3.7.6.1, "Plant Systems, Control Room Emergency Ventilation System," Technical Specification 3.9.4, "Refueling Operations, Containment Penetrations," Technical Specification 3.9.8.1, "Refueling Operations, Shutdown Cooling and Coolant Circulation - High Water Level," Technical Specification 3.9.8.2, "Refueling Operations, Shutdown Cooling and Coolant Circulation - Low Water Level," and Technical Specification 3.9.15, "Refueling Operations, Storage Pool Area Ventilation System." The basis for the proposed changes is a re-analysis of the limiting design basis Fuel Handling Accident (FHA) using an Alternative Source Term (AST) in accordance with 10 CFR 50.67 and Regulatory Guide 1.183[1] (see Attachment 1). The Bases for these Technical Specifications will also be modified to reflect these changes as applicable. Additionally, minor grammatical errors will be corrected. Each proposed change will be discussed.

Precedence

The proposed changes discussed within this license amendment request are similar to license amendments issued to Surry Plant License Nos. DPR-32 (Amendment No. 230) and DPR-37 (Amendment No. 230)[2] on March 8, 2002.

Evaluation of Nuclear Energy Institute Technical Specification Task Force (TSTF)-51

During the preparation of this submittal, DNC reviewed TSTF-51[3] for applicability. According to the justification associated with this generic change, the proposed changes are based on performing analyses that assume a longer decay period to take advantage of the reduced radioiodine inventory available for release in the event of a FHA. The re-analysis of the Millstone Unit No. 2 FHA using the AST methodology assumed a shorter decay time. Therefore, it is not appropriate for DNC to adopt this TSTF for Millstone Unit No. 2.

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(1) U.S. NRC Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design-Basis Accidents at Nuclear Power Plants," issued July 2000.

(2) Gordon E. Edison, Sr., U.S. NRC to David A. Christian, Virginia Electric and Power Company, "Surry Units 1 and 2 - Issuance of Amendments Re: Alternative Source Term (TAC Nos. MA8649 and MA8650)," dated March 8, 2002.

(3) TSTF-51, Revision 2, "Revise Containment Requirements during Handling Irradiated Fuel and Core Alterations," NRC approved November 1, 1999.

Technical Specification Changes

Technical Specification 3.3.3.1 and Technical Specification 3.3.4

Technical Specification 3.3.3.1, Table 3.3-6, Item 2.a, "Containment Atmosphere-Particulate," and Item 2.b, "Containment Atmosphere-Gaseous," perform two distinct functions. These airborne radiation monitors provide for a Containment purge valve isolation signal on increasing airborne radioactivity levels within the Containment (see Technical Specification 3.3.4). These monitors also aid in the detection of a Reactor Coolant System leak by providing indication of an increasing trend in Containment airborne radioactivity levels (see Technical Specification 3.4.6.1). Upon identification of an increasing trend in Containment airborne radioactivity levels, a determination of RCS leakage (if any) is quantified using a water inventory balance (see Technical Specification 3.4.6.2).

The revised FHA Analyses do not assume automatic closure of the Containment purge valves on increasing airborne radioactivity levels. Therefore, DNC proposes to revise Technical Specification 3.3.3.1 to focus on the airborne radiation monitor function of aiding in RCS leak detection and revise Technical Specification 3.3.4 to focus on the airborne radiation monitors Containment purge valve isolation function (Modes 1, 2, 3, and 4).

1. Surveillance Requirement 4.3.3.1.2 provides criteria for the determination and verification of the trip value for the Containment purge valve isolation signal from the Containment atmosphere particulate and gaseous monitors. This surveillance requirement will be relocated to Technical Specification 3.3.4, "Containment Purge Valve Isolation Signal," and incorporated into Surveillance Requirement 4.3.4.2. The word "Deleted" will be added for Surveillance Requirement 4.3.3.1.2.

   Technical Specification Surveillance Requirement 4.3.4.2 requires that a channel functional test be performed on each Containment purge valve isolation signal at least once per 31 days. This surveillance with be revised by the addition of the following discussion:

   "This surveillance shall include verification of the trip value in accordance with the following:

   The trip value shall be such that the containment purge effluent shall not result in calculated concentrations of radioactivity offsite in excess of 10 CFR Part 20, Appendix B, Table II. For the purposes of calculating this trip value, a X/Q = 5.8 x 10^{-6} sec/m^3 shall be used when the system is aligned to purge through the building vent and a X/Q = 7.5 x 10^{-8} sec/m^3 shall be used when the system is aligned to purge through the Unit 1 stack, the gaseous and particulate (Half Lives greater than 8 days) radioactivity shall be assumed to be Xe-133 and Cs-137, respectively. However, the setpoints shall be no greater than 5 x10^5 cpm."

2. The applicability of Technical Specification 3.3.4 will be revised consistent with the assumptions of the revised FHA Analyses. The revised FHA Inside

Containment Analysis no longer assumes automatic closure of the Containment purge valves during a FHA inside Containment, the analysis assumes that the Containment purge valves remain open (see Attachment 1). Therefore, the phrases "During CORE ALTERATIONS with the containment purge valves open" and "During the movement of irradiated fuel assemblies inside containment with the containment purge valves open" will be deleted from the applicability of Technical Specification 3.3.4.

Although the revised FHA Analyses does not credit automatic closure of the Containment purge, DNC will establish sufficient administrative controls for manual closure of the Containment purge valves within 30 minutes of a FHA as a defense-in-depth measure to mitigate the consequences of a FHA consistent with the recommendations of Regulatory Guide 1.183. These administrative controls are further discussed in the proposed changes to Technical Specification 3.9.4, item 1.

Technical Specification 3.6.3.2, "Containment Ventilation System," requires that the Containment purge valves be maintained sealed closed in Modes 1, 2, 3, and 4. In addition, the Containment purge valves are the Containment isolation valves and therefore they are also covered under Technical Specification 3.6.3.1, "Containment Isolation Valves." However, in the event that a Containment purge valve might be open, a Containment purge valve isolation signal is provided. The verification of closure of the Containment purge valves on a Containment Radiation-High signal is provided by Surveillance Requirement 4.6.3.1.2. Therefore, the applicability of Technical Specification 3.3.4 will be revised to include the phrase "Modes 1, 2, 3, and 4."

3. The actions for Technical Specification 3.3.4 will be revised consistent with the proposed changes to the applicability of this specification discussed in item 2 of this specification, i.e. Modes 1, 2, 3, and 4. Actions a., b., and c. will be deleted and replaced with the following action:

   "With no OPERABLE containment purge valve isolation signal, containment gaseous radiation monitoring channel, containment purge valve isolation signal, containment particulate radiation monitor channel, and containment purge valve isolation signal automatic logic train, enter the applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.6.3.1, "Containment Isolation Valves."

   Technical Specification 3.6.3.1 provides the appropriate actions for an inoperable Containment purge valve isolation signal consistent with Surveillance Requirement 4.6.3.1.2.b.

4. The applicability of Technical Specification 3.3.3.1, Table 3.3-6, Item 2.a, "Containment Atmosphere-Particulate," and Item 2.b, "Containment Atmosphere-Gaseous," will be revised by replacing the phrase "ALL MODES**" with the phrase "1, 2, 3, & 4."

With the proposed changes to Technical Specification 3.3.4 discussed in items 1, 2, and 3 of this specification, the Containment purge valve isolation signal function of the Containment atmosphere particulate and gaseous monitors has been relocated from Technical Specification 3.3.3.1 to Technical Specification 3.3.4. The Containment atmosphere particulate and gaseous monitor RCS leakage detection function is not credited in Modes 5 and 6 for any design basis accident. Therefore, the "Modes in which Surveillances are Required" of Table 3.3-6, Item 2.a and Item 2.b will be revised to apply only to Modes 1, 2, 3, and 4.

Additionally, the Containment atmosphere particulate and gaseous monitors do not provide an alarm or trip setpoint for the RCS leakage detection function. These monitors only provide for an aid in detecting RCS leakage by indication of increasing airborne radioactivity levels (see Specification 3.4.6.1). Technical Specification 3.3.3.1, Table 4.3-3 requires that a channel check be performed on a "S," or at least per 12 hour frequency to ensure timely identification of the increasing trend in Containment airborne radioactivity levels. Therefore, the alarm/trip setpoint for Table 3.3-6, Items 2.a and 2.b will be marked "NA."

5. Action 14 of Technical Specification 3.3.3.1, Table 3.3-6 will be revised. Action 14 of this table only applies to Items 2.a and 2.b, the Containment atmosphere particulate and gaseous airborne radiation monitors. Action 14 currently requires:

   "With the number of process monitors OPERABLE less than required by the MINIMUM CHANNELS OPERABLE requirement either (a) obtain and analyze grab samples of the monitored parameter at least once per 24 hours, or (b) use a Constant Air Monitor to monitor the parameter."

   With the proposed changes to Table 3.3-6, the atmosphere particulate and gaseous airborne radiation monitors (items 2.a and 2.b) only provide for an aid in detecting RCS leakage by measuring Containment atmosphere radiation levels, as defined in Technical Specification 3.4.6.1. Therefore, if these monitors are inoperable, Technical Specification 3.4.6.1 provides the appropriate actions for an inoperable leakage detection system.

   Action 14 of Table 3.3-6 will be revised to state:

   "With the number of process monitors OPERABLE less than the required by the MINIMUM CHANNELS OPERABLE requirement, comply with the ACTION requirements of Specification 3.4.6.1."

6. Note "**" of Table 3.3-6 will be deleted. This note applies to the operability of Table 3.3-6 Items 2.a and 2.b when Type "A" Integrated Leak Rate testing is performed. Since this testing is performed in Mode 5, a mode for which Items 2.a and 2.b are no longer required to be operable, this note can be deleted.

7. Technical Specification 3.3.3.1, Table 3.3-6, "Radiation Monitoring Instrumentation," Item 1.a, "Area Monitors - Spent Fuel Storage and Ventilation System Isolation," will be deleted and replaced with the word "Deleted."

The spent fuel storage area monitors provide a signal to direct the ventilation exhaust from the spent fuel storage area through a filter train when the dose rate exceeds the setpoint. The filter train is provided to reduce the particulate and iodine radioactivity released to the outside atmosphere.

The current FHA Analyses assume that spent fuel storage area ventilation is manually aligned for filtration prior to and during irradiated fuel or cask movement. The revised FHA Analyses do not assume manual or automatic diversion of the spent fuel storage area ventilation exhaust through an Enclosure Building Filtration Train for accident mitigation, nor does the revised FHA Analyses assume that spent fuel storage area ventilation exhaust is filtered prior to release to the environment (see Attachment 1). Therefore, Item 1.a can be deleted.

Consistent with the deletion of Technical Specification 3.3.3.1, Table 3.3-6, Item 1.a, Note "*," which defines the applicable modes for item 1.a, will be deleted and Action 13 of this table, which only defines the required actions if item 1.a is inoperable, will be deleted and replaced with the word "Deleted."

8. Consistent with the proposed changes discussed in Item 1 of this section, Technical Specification 3.3.3.1, Table 4.3-3, "Radiation Monitoring Surveillance Requirements," Item 1.a, "Spent Fuel Storage Ventilation System Isolation" will be deleted.

   Consistent with this change, Note "*," which defines the modes in which surveillances are required for Item 1.a, will be deleted. Note "**," and the reference to this note within Table 4.3-3 will be relabeled as Note "*," consistent with the deletion of Note "*." This is a non-technical change.

9. Consistent with the proposed change discussed in Item 4 of this section, the "Modes in which Surveillances are Required" for Table 4.3-3, Items 2.a and 2.b will be changed from "All Modes" to "1, 2, 3, & 4."

Technical Specification 3.7.6.1

1. The Applicability for Technical Specification 3.7.6.1, "Plant Systems, Control Room Emergency Ventilation System," will be revised by deleting reference to Modes 5 and 6. The phrase ", 5, and 6" will be deleted. The word "and" will be added before "4" for completeness.

   The Control Room Emergency Ventilation (CREV) System is not required to be OPERABLE at all times in Modes 5 and 6. When the plant is below Mode 4, the revised FHA Analyses only credits the CREV System with performing a safety function during the movement of irradiated fuel within Containment or the Spent Fuel Pool (see Attachment 1). The Applicability of this specification already requires that the CREV System be OPERABLE "During fuel movement within containment or the spent fuel pool." Additionally, irradiated fuel is not moved within Containment while in Mode 5. Therefore, reference to Modes 5 and 6 in the applicability is not necessary and can be deleted.

2. The Applicability of Technical Specification 3.7.6.1 will be revised consistent with the assumptions of the revised FHA Analyses, the term "irradiated" will be added before the Applicability phrase "fuel movement within containment." The revised FHA Analyses do not require the CREV System to be operable during the movement of new fuel (see Attachment 1).

   Additionally, the phrase "During movement of a shielded cask over the spent fuel pool cask laydown area." will be deleted since the revised FHA Analyses do not postulate a shielded cask drop as a limiting case accident. The revised FHA Analyses only requires that the CREV System be operable when irradiated fuel is being moved in the Containment or the Spent Fuel Pool.

3. Consistent with the revised FHA Analyses, Actions b., c., d., and e. of Technical Specification 3.7.6.1 will be revised by deleting reference to the shielded cask drop accident. The phrase "and the movement of shielded casks over the spent fuel pool cask laydown area" will be deleted from Technical Specification Actions b. and c., and the phrase ", and the movement of shielded casks over the spent fuel pool cask laydown area" will be deleted from Technical Specification Actions d., and e. Actions 'b.,' 'c.,' 'd.,' and 'e.' will be revised by the inclusion of the word "irradiated" prior to the phrase "fuel assemblies" consistent with the assumptions of the revised FHA Analyses.

   Additionally, Actions 'd.' and 'e.' will be revised by inclusion of the word "and" prior to the phrase "the movement of fuel assemblies" for readability. This is a non-technical change.

4. Consistent with the proposed change discussed in Items 1 and 2 of this section, Actions d. and e. will be revised by replacing the applicability phrase "MODES 5 and 6, and all other times" with the phrase "During irradiated fuel movement within containment or the spent fuel pool."

<u>Technical Specification 3.9.4</u>

1. The Limiting Condition for Operation (LCO) of Technical Specification 3.9.4, item a. will be revised by replacing the phrase "and held in place by a minimum of four bolts" with the phrase "under administrative control*." Additionally, the phrase, "or capable of being closed" will be inserted after the phrase "The equipment door closed." The revised LCO, item a., will read, "The equipment door closed or capable of being closed under administrative control.*"

   The revised FHA Analyses assumes that all of the radioactive material which could be released to the Containment atmosphere exits the Containment within 2 hours of accident initiation with no credit taken for the Containment boundary integrity (see Attachment 1). Consistent with minimizing the dose released to the environment, DNC will establish administrative controls to ensure that the equipment door, and other Containment penetrations which provide direct access to the outside atmosphere, can be closed to form a Containment atmosphere boundary within 30 minutes of accident initiation as a defense-in-depth measure to mitigate the consequences of a FHA.

Note "*" will be added to define the required administrative controls necessary for an equipment door, as well as any other Containment penetration, to be opened during movement of irradiated fuel assemblies within Containment.

Note "*" will state: "Administrative controls shall ensure that appropriate personnel are aware that the equipment door, personnel air lock door and/or other containment penetrations are open, and that a specific individual(s) is designated and available to close the equipment door, personnel air lock door and/or other containment penetrations within 30 minutes if a fuel handling accident occurs. Any obstructions (e.g. cables and hoses) that could prevent closure of the equipment door, a personnel air lock door and/or other containment penetration must be capable of being quickly removed."

The current Millstone Unit No. 2 Technical Specifications do not prohibit the opening of Containment penetrations during certain outage evolutions (irradiated fuel movement requires that containment integrity be maintained). DNC currently maintains procedural controls for managing the closure of any Containment penetration which provides direct access to the outside atmosphere opened during an outage. Upon implementation of this proposed license amendment, these procedural controls would apply to the equipment door, personnel air lock door and/or other Containment penetrations which are opened during the movement of irradiated fuel.

The procedural controls will require that designated personnel be available for isolation of Containment from the outside atmosphere. Procedural controls will also be in place to ensure cables or hoses which pass through a Containment opening can be quickly removed. The location of each cable and hose isolation device for those cables and hoses which pass through a Containment opening is recorded to ensure timely closure of the Containment boundary. Additionally, a closure plan is developed for each Containment opening which includes an estimated time to close the Containment opening. A log of personnel designated for Containment closure will be maintained, including identification of which Containment openings each person has responsibility for closing.

Prior to opening a Containment penetration, a review of Containment penetrations currently open will be performed to verify that sufficient personnel are designated such that all Containment penetrations can be closed within 30 minutes. Designated personnel may have other duties, however, they must be available such that their assigned Containment openings can be closed within 30 minutes of the initiation of a FHA Each new work activity inside Containment will be reviewed to consider its effect on the closure of the equipment door, personnel air lock, and/or other open Containment penetrations. Designated personnel will be continuously available to perform closure of their assigned Containment openings whenever irradiated fuel is being moved within the

Containment. As necessary, equipment will be pre-staged to support timely closure of a Containment penetration. However, if it is determined that closure of all Containment penetrations would represent a significant radiological hazard to the personnel involved, the decision may be made to forgo the closure of the affected penetration(s). Additionally, the equipment door can be closed without electrical power or compressed air.

DNC will establish these administrative controls such that any Containment penetration which provides direct access to the outside atmosphere, including the equipment door and personnel air lock door can be manually closed within 30 minutes of a FHA. DNC will also verify the ability to close the equipment door within 30 minutes at least once every outage in which irradiated fuel is moved within Containment, prior to commencing any irradiated fuel movement. Additionally, DNC will also establish the necessary procedural controls such that the guidelines of Nuclear Utility Management and Resources Council (NUMARC) 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,"[(4)] Section 11.3.6.5, are followed.

Administrative controls are also in place to ensure that the Containment atmosphere boundary is established if adverse weather conditions which could present a potential missile hazard threaten the plant. Weather conditions are monitored during irradiated fuel movement whenever a Containment penetration, including the equipment door and personnel airlock door, is open and a storm center is within the plant monitoring radius of 150 miles.

The administrative controls ensure that the Containment atmosphere boundary can be quickly established (i.e. within 30 minutes) upon determination that adverse weather conditions exist which pose a significant threat to the Millstone Site. A significant threat exists when a hurricane warning or tornado warning is issued which applies to the Millstone Site, or if an average wind speed of 60 miles an hour or greater is recorded by plant meteorological equipment. If the meteorological equipment is inoperable, information from the National Weather Service will be used as a backup in determining plant wind speeds. Closure of Containment penetrations, including the equipment door and personnel airlock door, begin immediately upon determination that a significant threat exists.

2. Item b.2. of the LCO for Technical Specification 3.9.4 will be revised by deleting the phrase "with containment purge in operation,."

   The current FHA inside Containment Analysis assumes that Containment purge is in operation during the initial phases of the accident to control the release of radioactive material until such time as the personnel air lock can be closed. The revised FHA Analysis does not make any assumptions as to Containment purge operation during a FHA (see Attachment 1). Therefore, this phrase can be deleted.

[(4)] NUMARC 93-01, Revision 3, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," July 2000.

Additionally, item b.2. of the LCO for this specification will be revised by adding a reference to note "*" after the phrase "administrative control." This change will ensure that the necessary administrative controls are in place for opening the personnel air lock door consistent with the revised FHA Analyses.

3. Consistent with the proposed changes discussed in item 1 of this section, item c.2. of the LCO for Technical Specification 3.9.4 will be revised by replacing the phrase " by an OPERABLE Containment Purge Valve Isolation System." with the phrase "under administrative control.*"

   As discussed in Attachment 1, the revised FHA Analyses does not take any credit for automatic closure of the Containment purge valves. However, DNC will establish appropriate administrative controls such that the Containment purge valve, and other Containment penetrations, can be manually closed in 30 minutes of a FHA. This change will ensure that the necessary administrative controls are in place for opening a Containment penetration consistent with the revised FHA Analyses.

4. The applicability for Technical Specification 3.9.4 will be revised by deleting "During Core Alterations." With the revised FHA Analyses (see Attachment 1) the only events which are postulated to occur during Core Alterations include the boron dilution event, and a FHA. The only accident postulated to occur during core alterations that has the potential to cause a radioactive release is a FHA involving irradiated fuel. Since the existing Applicability for this specification states "During movement of irradiated fuel assemblies within containment," retention of Core Alterations with the Applicability section of this specification is not necessary.

   Technical Specifications 3.9.1, "Refueling Operations, Boron Concentrations," and 3.9.2, "Refueling Operations, Instrumentation," provide the appropriate controls for preventing a boron dilution event.

   Consistent with these changes, the term "CORE ALTERATIONS or" will be removed from the Action of Technical Specification 3.9.4.

5. The Action for Technical Specification 3.9.4 will be revised by inserting the term "assemblies" after the phrase "movement of irradiated fuel." This change provides for consistency of reference within Technical Specification 3.9.4. This is a non-technical change.

6. Technical Specification Surveillance Requirement 4.9.4.2 will be deleted and replaced with the word "Deleted." Consistent with the changes discussed in item 1 for this specification, the automatic closure of the Containment purge valves is no longer credited in the revised FHA Analyses.

Technical Specification 3.9.8.1

1. Note 3.c.3)b) of Technical Specification 3.9.8.1 will be deleted and Note 3.c.3)a) will be revised.

   Note 3.c.3)b) currently requires that the Containment purge valves be capable of being closed by a Containment Purge Valve Isolation System when the shutdown cooling pumps are removed from service (water level $\geq$ 23 feet above the top of the reactor vessel flange) to perform local leak rate testing of Containment penetration number 10 or to permit maintenance on valves located in the common Shutdown Cooling System suction line.

   Deletion of Note 3.c.3)b) will require that all penetrations having direct access from the Containment atmosphere to the outside atmosphere (including the Containment purge penetrations) be maintained in accordance with Note 3.c.3)a), i.e. closed, either by a manual or automatic isolation valve, blind flange, or equivalent. This is a more conservative change.

   Consistent with the deletion of Note 3.c.3)b), the words "either:," and ", or" will be deleted from note 3.c.3. The word "Closed" will be made lowercase and a period will be added at the end of the action. The identifier for Note 3.c.3)a), or "a.," will be deleted. These are non-technical changes.

2. Action c.3.b. of Technical Specification 3.9.8.1 will be deleted consistent with the proposed changes described in item 1 for this specification.

   Action c.3.b. requires that the Containment purge valves be capable of being closed by a Containment Purge Valve Isolation System within 4 hours if no shutdown cooling trains are operable.

   Deletion of Note c.3.b. will require that all penetrations having direct access from the Containment atmosphere to the outside atmosphere (including the Containment purge penetrations) be maintained in accordance with Note c.3.a., i.e. closed, either by a manual or automatic isolation valve, blind flange, or equivalent. This is a more conservative change.

   Consistent with the deletion of Action c.3.b., the words "either:," and ", or" will be deleted from Note c.3. The word "Closed" will be made lowercase and a period will be added at the end of the action. The identifier for Action c.3.a., or "a.," will be deleted. These are non-technical changes.

3. Action b. of Technical Specification 3.9.8.1 will be revised by correcting the spelling of the word "initiate." This is a non-technical change.

Technical Specification 3.9.8.2

1. Action b.3.c)2) of Technical Specification 3.9.8.2 will be deleted.

Action b.3.c)2) requires that the Containment purge valves be capable of being closed by a Containment Purge Valve Isolation System within 4 hours if no shutdown cooling trains are operable when in Mode 6 with water level < 23 feet above the top of the reactor vessel flange.

Deletion of Action b.3.c)2) will require that all penetrations having direct access from the Containment atmosphere to the outside atmosphere (including the Containment purge penetrations) be maintained in accordance with Action b.3.c)1)., i.e. closed, either by a manual or automatic isolation valve, blind flange, or equivalent. This is a more conservative change.

2. Consistent with the deletion of Action b.3.c)2), the words "either:," and ", or" will be deleted from Action b.3.c). The word "Closed" will be made lowercase and a period will be added at the end of the action. The identifier for Action b.3.c)1), or "1)," will be deleted. These are non-technical changes.

Technical Specification 3.9.15

Millstone Unit No. 2 Technical Specification 3.9.15 will be deleted. Technical Specification 3.9.15 provides the requirements for the storage pool area ventilation system. With the implementation of the AST FHA Analyses, this specification no longer addresses any equipment which is credited with the mitigation of a design basis accident. Additionally, this specification does not meet any of the criteria of 10 CFR 50.36c(2)(ii) for items which must be retained in the Technical Specifications (see Safety Summary discussion). Therefore, Technical Specification 3.9.15 is proposed to be deleted.

As a defense-in-depth measure to limit actual releases to the outside atmosphere much lower than assumed in the AST FHA Analyses dose calculations, procedural guidance will be available for closing Spent Fuel Pool area atmosphere boundary penetrations if a FHA occurs inside the Spent Fuel Pool area.

Index Pages

Index page IX for Millstone will be revised to reflect the deletion of Technical Specification 3.9.15.

Technical Specification Bases

As previously discussed, the Technical Specification Bases shall be modified consistent with the proposed changes to Technical Specifications 3.3.3.1, 3.3.4, 3.7.6.1, 3.9.4, 3.9.8.1, 3.9.8.2, and 3.9.15.

Safety Summary

Analyses Changes

The Millstone Unit No. 2 FHA Analyses - Fuel Handling Accident in the Containment, Fuel Handling Accident in the Spent Fuel Pool Area, and the Cask Drop Accident in the Spent Fuel Pool Area have changed consistent with the AST methodology of 10 CFR 50.67 and

Regulatory Guide 1.183. Numerous changes to the analyses have been made. The assumptions of these analyses are provide in Table 5, Table 7, and Table 9 of Attachment 1.

The calculated radiological consequences of the revised FHA Inside Containment, the FHA Inside the Spent Fuel Pool Area, and the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area at Millstone Unit No. 2 are within the EAB, LPZ, and Control Room dose limits of 10 CFR 50.67, and within the limits of Regulatory Guide 1.183. Therefore, the proposed analyses revisions will not adversely affect public health and safety, and the proposed changes are safe.

Technical Specification 3.9.15

This specification provides for the criteria used in determining operability of the Storage Pool Area Ventilation System. The applicability of this specification is during fuel movement within the Spent Fuel Pool when irradiated fuel assemblies that have decayed less than 60 days are located in the Spent Fuel Pool and during movement of a shielded cask over the Spent Fuel Pool cask laydown area. Since the revised FHA Analyses, the only accident analyses applicable to this specification, does not credit the operability of the Storage Pool Area Ventilation System, this specification is proposed for deletion. Additionally, this specification does not meet the criteria of 10 CFR 50.36c(2)(ii).

10 CFR 50.36c(2)(ii) contains the requirements for items that must be in Technical Specifications. This regulation provides four (4) criteria that can be used to determine the requirements that must be included in the Technical Specifications.

Criterion 1

Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

This requirement provides for the criteria used in determining operability of the Storage Pool Area Ventilation System This requirement does not cover installed instrumentation that is used to detect, and indicate in the control room, a significant degradation of the reactor coolant pressure boundary. This specification does not satisfy Criterion 1.

Criterion 2

A process variable, design feature, or operating restriction that is an initial condition of a DBA or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

This requirement provides for the criteria used in determining operability of the Storage Pool Area Ventilation System. This requirement does not cover a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. This specification does not satisfy Criterion 2.

Criterion 3

A System, Structure, or Component (SSC) that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

This requirement, which provides the criteria used in determining operability of the Storage Pool Area Ventilation System, is no longer a feature that is used to mitigate the consequences of a FHA or cask drop accident in the Spent Fuel Pool area. The revised FHA in the Spent Fuel Pool Area Analysis takes no credit for the operability of the Storage Pool Area Ventilation System. Therefore, this feature does not cover a structure, system, or component that is part of the primary success path which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. This specification does not satisfy Criterion 3.

Criterion 4

A SSC which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

This requirement, which provides the criteria used in determining operability of the Storage Pool Area Ventilation System, has not been shown to be risk significant to public health and safety by either operating experience or probabilistic safety assessment. The Storage Pool Area Ventilation System is not required to function to ensure radiological dose criteria for the EAB, LPZ, or control room is met. With the changes proposed in this submittal, this requirement no longer covers a structure, system, or component which requires risk review/unavailability monitoring. This specification does not satisfy Criterion 4.

In conclusion, the proposed changes to this specification do not cover plant equipment which is credited to function in the event of a design basis accident. Additionally, the requirements contained in this specification do not meet any of the 10 CFR 50.36c(2)(ii) criteria on items for which Technical Specifications must be established. Therefore, the proposed changes to delete Technical Specifications 3.9.15 will not have an adverse impact on public health and safety and the proposed changes are safe.

<u>Technical Specification Changes - Containment Purge Valve Isolation</u>

The proposed changes to the Millstone Unit No. 2 Technical Specifications associated with the Containment purge valve isolation, Technical Specifications 3.3.3.1, 3.3.4, 3.7.6.1, 3.9.4, 3.9.8.1 and 3.9.8.2 are consistent with the revised FHA Analyses and do not pose a condition adverse to safety and do not create any adverse safety consequences. The rationale for this conclusion is provided below.

The automatic isolation of the Containment purge valves is not credited in the revised FHA Analysis in Containment, the only FHA analysis applicable to an accident in the Containment (see Attachment 1). The revised FHA Analysis in Containment takes no credit for Containment purge valve operation for the duration of the release, resulting in all radioactive material released to the outside environment within 2 hours of a FHA. The proposed changes are consistent with the revised FHA Analysis in Containment, ensuring that the calculated LPZ, EAB, and control room dose remain within the regulatory limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183. The proposed changes will not affect the probability of occurrence of a FHA.

Administrative controls will be established to ensure that the Containment purge valve is closed within 30 minutes to mitigate the consequences of a FHA. Additionally, the proposed changes are also consistent with existing Technical Specification requirements for the operability of the Containment Purge Valve Isolation Signal in Modes 1, 2, 3, and 4. Therefore, the proposed changes to Technical Specifications 3.3.3.1, 3.3.4, 3.7.6.1, 3.9.4, 3.9.8.1 and 3.9.8.2 for elimination of the automatic closure of Containment purge will not have an adverse impact on public health and safety and the proposed changes are safe.

Technical Specification Changes - Control Room Emergency Ventilation (CREV)

The proposed changes to Millstone Unit No. 2 Technical Specification 3.7.6.1 associated with CREV, are consistent with the revised FHA Analyses and do not pose a condition adverse to safety and do not create any adverse safety consequences. The rationale for this conclusion is provided below.

The proposed changes to Technical Specification 3.7.6.1 which eliminate requirements for CREV in the event of a spent fuel cask drop accident are consistent with the revised Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area Analysis (see Attachment 1). The revised analysis does not assume that control room isolation occurs. The proposed changes are consistent with the revised FHA Analyses, ensuring that the calculated LPZ, EAB, and control room dose remain within the regulatory limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183. The proposed changes will not affect the probability of occurrence of a FHA. Therefore, the proposed changes to Technical 3.7.6.1 for elimination of the requirements to maintain the CREV System operable during a spent fuel cask drop accident will not have an adverse impact on public health and safety and the proposed changes are safe.

The proposed changes to Technical Specification 3.7.6.1 which eliminate the requirements to maintain the CREV System operable at all times in Mode 5 and 6 are consistent with the revised FHA Accident Analyses. The revised FHA Accident Analyses only assume that the CREV System is operable if an irradiated FHA occurs. The proposed changes are consistent with the revised FHA Analyses, ensuring that the calculated LPZ, EAB, and control room dose remain within the regulatory limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183. The proposed changes will not affect the probability of occurrence of a FHA. Therefore, the proposed changes to Technical 3.7.6.1, which eliminate the requirements to maintain the CREV System operable at all times in Mode 5 and 6, will not have an adverse impact on public health and safety and the proposed changes are safe.

Technical Specification Changes - Containment Penetrations

The proposed changes to Millstone Unit No. 2 Technical Specifications 3.9.4 are consistent with the revised FHA Analyses and do not pose a condition adverse to safety and do not create any adverse safety consequences. The rationale for this conclusion is provided below.

The proposed changes to Technical Specification 3.9.4 allow Containment penetrations, including the equipment door and personnel airlock door, to be maintained open under administrative controls provided that they can be closed within 30 minutes. The revised FHA Analysis in Containment, the bounding FHA analysis applicable to an accident in Containment, does not take credit for any Containment penetrations to be closed. The proposed changes are consistent with the revised FHA Analysis in Containment, ensuring that the calculated LPZ, EAB, and control room dose remain within the regulatory limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183. The proposed changes will not affect the probability of occurrence of a FHA.

Administrative controls will be established such that all Containment penetrations can be closed within 30 minutes to mitigate the consequences of a FHA. Therefore, the proposed changes to Technical Specification 3.9.4 which allow Containment penetrations, including the equipment door and personnel airlock door, to be maintained open under administrative controls, will not have an adverse impact on public health and safety and the proposed changes are safe.

Technical Specification Changes - Spent Fuel Pool Storage and Ventilation System Isolation

The proposed changes to Millstone Unit No. 2 Technical Specification 3.3.3.1 is consistent with the revised FHA Analyses and do not pose a condition adverse to safety and do not create any adverse safety consequences. The rationale for this conclusion is provided below.

The proposed changes to Millstone Unit No. 2 Technical Specification 3.3.3.1 provide for the elimination of the spent fuel storage area ventilation system automatic isolation signal. These changes are consistent with the revised FHA Inside the Spent Fuel Pool Area Analysis and the Spent Fuel Cask Drop Accident Inside the Spent Fuel Pool Area Analysis, the applicable FHA analyses for the Spent Fuel Pool area. These analyses do not assume that the spent fuel storage and ventilation system is operable in the event of a fuel handling or spent fuel cask drop accident.

The proposed changes are consistent with the revised FHA Analysis for the irradiated FHA in the Spent Fuel Pool Area, and the Cask Drop Accident in the Spent Fuel Pool Area, ensuring that the calculated LPZ, EAB, and control room dose remain within the regulatory limits of 10 CFR 50.67 and within the limits of Regulatory Guide 1.183. The proposed changes will not affect the probability of occurrence of a FHA. Therefore, the proposed changes to Technical Specification 3.3.3.1, which provide for the elimination of the spent fuel storage area ventilation system automatic isolation signal, will not have an adverse impact on public health and safety and the proposed changes are safe.

Index Pages

Revision of Index page IX is an administrative change. This change is consistent with the changes previously discussed. Therefore, the proposed change will have no adverse effect on plant safety.

Conclusion

The proposed changes are consistent with the revised FHA Analyses. As such, the proposed changes continue to maintain the radioactive releases to the environment in the event of a FHA within the applicable regulatory limits. The proposed changes do not involve any physical modifications to plant equipment used in the movement, or storage of irradiated fuel. The proposed changes will not affect the probability of an accident previously evaluated. The proposed changes will not adversely affect the public health and safety. Therefore, the proposed changes are safe.

Docket No. 50-336
B18763

Attachment 3

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Significant Hazards Consideration

License Basis Document Change Request (LBDCR) 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Significant Hazards Consideration

Description of License Amendment Request

Dominion Nuclear Connecticut, Inc. (DNC), hereby proposes to amend Operating License DPR-65 by incorporating the attached proposed changes into the Millstone Unit No. 2 Technical Specifications. DNC is proposing to change Technical Specification 3.3.3.1, "Monitoring Instrumentation, Radiation Monitoring," Technical Specification 3.3.4, "Instrumentation, Containment Purge Valve Isolation Signal," Technical Specification 3.7.6.1, "Plant Systems, Control Room Emergency Ventilation System," Technical Specification 3.9.4, "Refueling Operations, Containment Penetrations," Technical Specification 3.9.8.1, "Refueling Operations, Shutdown Cooling and Coolant Circulation - High Water Level," Technical Specification 3.9.8.2, "Refueling Operations, Shutdown Cooling and Coolant Circulation - Low Water Level," and Technical Specification 3.9.15, "Refueling Operations, Storage Pool Area Ventilation System." The Bases for these Technical Specifications will also be modified to reflect these changes as applicable. A brief summary of the proposed changes is provided below. Refer to Attachment 2 of this submittal for a detailed discussion of the proposed changes.

Technical Specification Changes

- The Control Room Emergency Ventilation Technical Specification will be revised such that the Control Room Emergency Ventilation System is required to be operable in Modes 1, 2, 3, and 4; and during the movement of irradiated fuel.
- The Containment Purge Valve Isolation Signal shall no longer be credited with automatic closure of the Containment purge valves during irradiated fuel movement.
- The Technical Specifications shall be revised to include administrative controls if the Containment atmosphere boundary is open during irradiated fuel movement.
- The Technical Specification requirements associated with the Storage Pool Area Ventilation System will be deleted.

Basis for No Significant Hazards Consideration

In accordance with 10 CFR 50.92, DNC has reviewed the proposed changes and has concluded that they do not involve a Significant Hazards Consideration (SHC). The basis for this conclusion is that the three criteria of 10 CFR 50.92(c) are not compromised. The proposed changes do not involve an SHC because the changes do not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed changes involve the reanalysis of a Fuel Handling Accident (FHA) in the Containment, FHA in the Spent Fuel Pool Area, and the Cask Drop Accident in the Spent Fuel Pool Area. The new analyses, based on the Alternative Source Term (AST) in accordance with 10 CFR 50.67, will replace the existing analyses which are based on methodologies and assumptions derived from Regulatory Guide 1.25, Standard Review Plan (SRP) 15.7.4, SRP 15.7.5, and TID-14844. Because different methodologies are used, the new calculated doses are not directly comparable to the current calculated doses. If a consistent basis is used, it is expected that the new analyses assumptions in some cases result in a decrease in dose at the site boundary or to control room personnel and in some cases result in an increase in dose at the site boundary or to control room personnel. However, in all cases the analyses results are within the 10 CFR 50.67 and Regulatory Guide 1.183 acceptance criteria.

   As a result of the new analyses, changes to the Technical Specifications are proposed which take credit for the new analyses. The proposed changes to the Technical Specifications modify requirements regarding Containment closure and Spent Fuel Pool area ventilation during movement of irradiated fuel assemblies in Containment and in the Spent Fuel Pool area. The proposed changes will allow Containment penetrations, including the equipment door and personnel airlock door, to be maintained open under administrative control. The proposed changes will eliminate the requirements for automatic closure of Containment purge during Mode 6 fuel movement. The technical specifications associated with storage pool area ventilation will be deleted. These proposed changes do not involve physical modifications to plant equipment and do not change the operational methods or procedures used for the physical movement of irradiated fuel assemblies in Containment or in the Spent Fuel Pool area. As such, the proposed changes have no effect on the probability of the occurrence of any accident previously evaluated.

   The revised requirements apply only when irradiated fuel assemblies are being moved in Containment or the Spent Fuel Pool area. Previously evaluated accidents with the plant in other conditions including Modes 1 through Mode 5 are not impacted. The AST methodology is used to evaluate a FHA that is postulated to occur during fuel movement activities in Containment and in the Spent Fuel Pool area. The AST analyses follow the guidance of NRC Regulatory Guide 1.183 and the acceptance criteria of 10 CFR 50.67. The analyses demonstrate that the dose consequences meet the regulatory acceptance criteria.

   The FHA Analyses conservatively assume that the Containment building and the fuel storage building, including ventilation filtration systems for those buildings do not diminish or delay the assumed fission product release. The analysis does take credit for, and technical specifications enforce, the presence of 23 feet of water over the irradiated fuel while fuel movement activities are being performed. The analysis also takes credit for, and the technical specification bases enforce a fuel decay time of at least 72 hours. In addition, administrative controls are put in place to provide for closure of Containment atmosphere boundary openings in the event of a FHA. Use of an alternative analysis method does not affect fuel parameters or the equipment used to handle the fuel. The above proposed changes to the Technical Specifications reflect assumptions made in the FHA Analyses. The other changes to the Technical Specifications are also consistent with the revised FHA Analyses. Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed amendment involves the use of an alternative analysis methodology for the evaluation of the dose consequences from a FHA that is postulated to occur in either the Containment or the Spent Fuel Pool area. The analysis demonstrates that Containment closure conditions and automatic closure of the Containment purge are not required to maintain dose consequence within regulatory limits following a postulated FHA inside Containment. Therefore, the new analysis supports proposed changes to requirements for Containment closure during movement of irradiated fuel assemblies in Containment. The analysis results also demonstrate that operation of the Spent Fuel Pool area ventilation system is not required to maintain dose consequences within regulatory limits following a postulated FHA in the Spent Fuel Pool area. The Containment closure components (e.g., equipment door, personnel airlock doors, and various Containment penetrations) and filtration systems are not accident initiators. The proposed changes do not involve the addition of new systems or components nor do they involve the modification of existing plant systems. The proposed changes do not affect the way in which a FHA is postulated to occur. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3. Involve a significant reduction in a margin of safety.

The existing dose analysis methodology and assumptions demonstrate that the dose consequences of a FHA are within regulatory limits for whole body and thyroid doses as established in 10 CFR 100. The alternative dose analysis methodology and assumptions also demonstrate that the dose consequences of a FHA are within regulatory limits. The limits applicable to the alternative analysis are established in 10 CFR 50.67 in conjunction with the TEDE (total effective dose equivalent) acceptance criteria directed in Regulatory Guide 1.183. The acceptance criteria for both dose analysis methods have been developed for the purpose of evaluating design basis accidents to demonstrate adequate protection of public health and safety. An acceptable margin of safety is inherent in both types of acceptance criteria. Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Docket No. 50-336
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Attachment 4

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Marked-Up Pages

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
List of Affected Pages

Technical Specification Section Number	Title of Section	Affected Page with Amendment Number
3.3.3.1	Monitoring Instrumentation, Radiation Monitoring	3-26, Amendment No. 245 3-27, Amendment No. 245 3-28, Amendment No. 245 3-29, Amendment No. 157 B 3-2a, Amendment No. 245
3.3.4	Instrumentation, Containment Purge Valve Isolation Signal	3-61, Amendment No. 245 B 3-6, Amendment No. 250
3.7.6.1	Plant Systems, Control Room Emergency Ventilation System	7-16, Amendment No. 254 7-16a, Amendment No. 254 B 7-4a, NRC Letter dated May 1, 2002 B 7-4b, NRC Letter dated May 1, 2002 B 7-4c, NRC Letter dated May 1, 2002
3.9.4	Refueling Operations, Containment Penetrations	9-4, Amendment No. 245 B 9-1a, Amendment No. 245
3.9.8.1	Refueling Operations, Shutdown Cooling and Coolant Circulation - High Water Level	9-8, Amendment No. 249 9-8a, Amendment No. 249 B 9-2a, NRC Letter dated May 1, 2002
3.9.8.2	Refueling Operations, Shutdown Cooling and Coolant Circulation - Low Water Level	9-8b, Amendment No. 249
3.9.15	Refueling Operations, Storage Pool Area Ventilation System	9-16, Amendment No. 245 9-17, Amendment No. 245 9-18, Amendment No. 245 B 9-3, NRC Letter dated May 1, 2002 B 9-3a, NRC Letter dated May 1, 2002 B 9-3b, NRC Letter dated May 1, 2002
Index Page IX		Amendment No. 249

INSTRUMENTATION

3/4.3.3 MONITORING INSTRUMENTATION

RADIATION MONITORING

LIMITING CONDITION FOR OPERATION

3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in Table 3.3-6, adjust the setpoint to within the limit within 2 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels inoperable, take the ACTION shown in Table 3.3-6. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the modes and at the frequencies shown in Table 4.3-3. Replace with "Deleted"

4.3.3.1.2 The trip value shall be such that the containment purge effluent shall not result in calculated concentrations of radioactivity offsite in excess of 10 CFR Part 20, Appendix B, Table II. For the purposes of calculating this trip value, a $x/Q = 5.8 \times 10^{-6}$ sec/m^3 shall be used when the system is aligned to purge through the building vent and a $x/Q = 7.5 \times 10^{-8}$ sec/m^3 shall be used when the system is aligned to purge through the Unit 1 stack, the gaseous and particulate (Half Lives greater than 8 days) radioactivity shall be assumed to be Xe-133 and Cs-137, respectively. However, the setpoints shall be no greater than 5×10^5 cpm.

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION

Replace with "Deleted"

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM/TRIP SETPOINT	MEASUREMENT RANGE	ACTION
1. AREA MONITORS					
a. Spent Fuel Storage and Ventilation System Isolation	2	*	100 mR/hr	$10^{-1} - 10^{+4}$ mR/hr	13
b. Control Room Isolation	1	ALL MODES	2 mR/hr	$10^{-1} - 10^{4}$ mR/hr	16
c. Containment High Range	1	1,2,3,&4	100 R/hr	$10^{0} - 10^{8}$ R/hr	17
d. Noble Gas Effluent Monitor (high range) (Unit 2 stack)	1	1,2,3,&4	2×10^{-1} uci/cc	$10^{-3} - 10^{5}$ uci/cc	17
2. PROCESS MONITORS					
a. Containment Atmosphere-Particulate	1	ALL MODES**	the value determined in accordance with specification 4.3.3.1.2	$10 - 10^{+6}$ cpm	14
b. Containment Atmosphere-Gaseous	1	ALL MODES**	the value determined in accordance with Specification 4.3.3.1.2	$10 - 10^{+6}$ cpm	14

Replace with "1,2,3+4"

Replace with "NA"

Deleted

* With fuel in storage building.
**These radiation monitors are not required to be operable during Type "A" Integrated Leak Rate testing.

TABLE 3.3-6 (Continued)

TABLE NOTATION

(a) DELETED Replace with "Deleted"

ACTION 13 - With the number of area monitors OPERABLE less than required by the MINIMUM CHANNELS OPERABLE requirement, perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

Replace with

ACTION 14 - With the number of process monitors OPERABLE less than required by the MINIMUM CHANNELS OPERABLE requirement either (a) obtain and analyze grab samples of the monitored parameter at least once per 24 hours, or (b) use a Constant Air Monitor to monitor the parameter.

ACTION 15 - DELETED

ACTION 16 - With the number of OPERABLE channels less than required by the MINIMUM CHANNELS OPERABLE requirement, within 1 hour initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation.

ACTION 17 - With the number of OPERABLE channels less than required by the MINIMUM CHANNELS OPERABLE requirements, initiate the preplanned alternate method of monitoring the appropriate parameter(s), within 72 hours, and:

1) either restore the inoperable channel(s) to OPERABLE status within 7 days of the discovery or

2) prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 14 days following discovery outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

With the number of process monitors OPERABLE less than required by the MINIMUM CHANNELS OPERABLE requirement, comply with the action requirements of Specification 3.4.6.1.

TABLE 4.3-3

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. AREA MONITORS				
a. Spent Fuel Storage Ventilation System Isolation — Replace with "Deleted"	S	R	M	*
b. Control Room Isolation	S	R	M	ALL MODES
c. Containment High Range	S	R*@ Deleted	M	1, 2, 3, & 4
d. Noble Gas Effluent Monitor (high range) (Unit 2 Stack)	S	R	M	1, 2, 3, & 4
2. PROCESS MONITORS				
a. Containment Atmosphere-Particulate	S	R	M	1,2,3,&4 ~~ALL MODES~~
b. Containment Atmosphere-Gaseous	S	R	M	1,2,3,&4 ~~ALL MODES~~

Deleted

*With fuel in storage building

@*Calibration of the sensor with a radioactive source need only be performed on the lowest range. Higher ranges may be calibrated electronically.

INSTRUMENTATION

CONTAINMENT PURGE VALVE ISOLATION SIGNAL

LIMITING CONDITION FOR OPERATION

3.3.4 One Containment Purge Valve Isolation Signal containment gaseous radiation monitor channel, one Containment Purge Valve Isolation Signal containment particulate radiation monitor channel, and one Containment Purge Valve Isolation Signal automation logic train shall be OPERABLE.

Replace with "MODES 1, 2, 3, and 4"

APPLICABILITY: During CORE ALTERATIONS with the containment purge valves open.

During the movement of irradiated fuel assemblies inside containment with the containment purge valves open.

ACTION: Replace with Insert A

a. With no OPERABLE Containment Purge Valve Isolation Signal containment gaseous radiation monitor channel, immediately suspend CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment, or immediately place and maintain the containment purge valves in the closed position. Enter applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.9.4, "Containment Penetrations."

b. With no OPERABLE Containment Purge Valve Isolation Signal containment particulate radiation monitor channel, immediately suspend CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment, or immediately place and maintain the containment purge valves in the closed position. Enter applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.9.4, "Containment Penetrations."

c. With no OPERABLE Containment Purge Valve Isolation Signal automatic actuation logic train, immediately suspend CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment, or immediately place and maintain the containment purge valves in the closed position. Enter applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.9.4, "Containment Penetrations."

SURVEILLANCE REQUIREMENTS

4.3.4.1 Perform a CHANNEL CHECK on each Containment Purge Valve Isolation Signal containment gaseous and particulate radiation monitor channel at least once per 12 hours.

4.3.4.2 Perform a CHANNEL FUNCTIONAL TEST on each Containment Purge Valve Isolation Signal containment gaseous and particulate radiation monitor channel at least once per 31 days.

Insert B

INSERT A to Page 3/4 3-61

With no OPERABLE containment purge valve isolation signal, containment gaseous radiation monitoring channel, containment purge valve isolation signal, containment particulate radiation monitor channel, and containment purge valve isolation signal automatic logic train, enter the applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.6.3.1, "Containment Isolation Valves."

INSERT B to Page B3/4 3-61

This surveillance shall include verification of the trip value in accordance with the following:

The trip value shall be such that the containment purge effluent shall not result in calculated concentrations of radioactivity offsite in excess of 10 CFR Part 20, Appendix B, Table II. For the purposes of calculating this trip value, a x/Q = 5.8×10^{-6} sec/m^3 shall be used when the system is aligned to purge through the building vent and a x/Q = 7.5×10^{-8} sec/m^3 shall be used when the system is aligned to purge through the Unit 1 stack, the gaseous and particulate (Half Lives greater than 8 days) radioactivity shall be assumed to be Xe-133 and Cs-137, respectively. However, the setpoints shall be no greater than 5×10^5 cpm.

SURVEILLANCE REQUIREMENTS

4.3.4.3 Perform a CHANNEL FUNCTIONAL TEST on each Containment Purge Valve Isolation Signal automatic actuation logic train at least once per 31 days. This actuation logic shall include verification of the proper operation of the actuation relay.

4.3.4.4 Perform a CHANNEL CALIBRATION on each Containment Purge Valve Isolation Signal containment gaseous and particulate radiation monitor channel at least once per 18 months.

4.3.4.5 Verify Containment Purge Valve Isolation Signal response time at least once per 18 months. Each test shall include at least one containment gaseous and one containment particulate radiation monitor channel such that all channels are tested at least once every N times 18 months where N is the total number of containment gaseous or total number of containment particulate radiation monitor channels.

 Info Only

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.6.1 The following Reactor Coolant System leakage detection systems shall be OPERABLE:

a. A containment atmosphere particulate radioactivity monitoring system,

b. The containment sump level monitoring system, and

c. A containment atmosphere gaseous radioactivity monitoring system.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one of the above radioactivity monitoring leakage detection systems inoperable, operations may continue for up to 30 days provided:

   1. The other two above required leakage detection systems are OPERABLE, and

   2. Appropriate grab samples are obtained and analyzed at least once per 24 hours:

   otherwise, be in COLD SHUTDOWN within the next 36 hours.

b. With the containment sump level monitoring system inoperable, restore the inoperable system to OPERABLE status within 7 days or be in COLD SHUTDOWN within the next 36 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Containment atmosphere gaseous and particulate monitoring systems-performance of CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies specified in Table 4.3-3, and

b. Containment sump level monitoring system-performance of CHANNEL CALIBRATION TEST at least once per 18 months.

Info Only

REACTOR COOLANT SYSTEM

March 10, 1999

REACTOR COOLANT SYSTEM LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 GPM UNIDENTIFIED LEAKAGE,

c. 0.035 GPM primary-to-secondary leakage through any one steam generator, and

d. 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, be in COLD SHUTDOWN within 36 hours.

b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE, reduce the leakage rate to within limits within 4 hours or be in COLD SHUTDOWN within the next 36 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.2.1 Reactor Coolant System IDENTIFIED LEAKAGE and UNIDENTIFIED LEAKAGE shall be demonstrated to be within limits by performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation except when operating in the shutdown cooling mode.

4.4.6.2.2 Primary to secondary leakage shall be demonstrated to be within the above limits by performance of a primary to secondary leak rate determination at least once per 72 hours. The provisions of Specification 4.0.4 are not applicable for entry into MODE 4.

Info Only

3/4.6.3 CONTAINMENT ISOLATION VALVES

LIMITING CONDITION FOR OPERATION

3.6.3.1 Each containment isolation valve shall be OPERABLE.*

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one or more of the isolation valve(s) inoperable, either:

a. Restore the inoperable valve(s) to OPERABLE status within 4 hours, or

b. Isolate the affected penetration(s) within 4 hours by use of a deactivated automatic valve(s) secured in the isolation position(s), or

c. Isolate the affected penetration(s) within 4 hours by use of a closed manual valve(s) or blind flange(s); or

d. Be in COLD SHUTDOWN within the next 36 hours.

SURVEILLANCE REQUIREMENTS

4.6.3.1.1 Each isolation valve testable during plant operation shall be demonstrated OPERABLE:

a. At least once per 92 days by:

1. Exercising each power operated valve through one complete cycle of full travel and measuring the isolation time, and

2. Exercising each manual valve, except those that are closed, through one complete cycle of full travel.

b. Immediately prior to returning the valve to service after maintenance, repair or replacement work is performed on the

*Locked or sealed closed valves may be opened on an intermittent basis under administrative controls.

Info Only

SURVEILLANCE REQUIREMENTS (Continued)

valve or its associated actuator, control or power circuit by performance of the applicable cycling test, above.

4.6.3.1.2 Each isolation valve shall be demonstrated OPERABLE during the COLD SHUTDOWN or REFUELING MODE at least once per 18 months by:

a. Verifying that on a containment isolation test signal, each isolation valve actuates to its isolation position,

b. Verifying that on a Containment Radiation-High signal, all containment purge valves actuate to their isolation position,

c. Exercising each power operated valve not testable during plant operation, through one complete cycle of full travel and measuring its isolation time, and

d. Exercising each manual valve not locked, sealed or otherwise secured in position through at least one complete cycle of full travel.

Info Only

June 16, 1998

CONTAINMENT SYSTEMS

CONTAINMENT VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.3.2 The containment purge supply and exhaust isolation valves shall be sealed closed.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one containment purge supply and/or one exhaust isolation valve open, close the open valve(s) within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.3.2 The containment purge supply and exhaust isolation valves shall be determined sealed closed at least once per 31 days.

PLANT SYSTEMS

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.6.1 Two independent Control Room Emergency Ventilation Trains shall be OPERABLE.*

and — Deleted

APPLICABILITY: MODES 1, 2, 3, and 4, 5, and 6

included

During fuel movement within containment or the spent fuel pool. — Deleted

During movement of a shielded cask over the spent fuel pool cask laydown area.

ACTION:

MODES 1, 2, 3, and 4:

a. With one Control Room Emergency Ventilation Train inoperable, restore the inoperable train to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

included — Deleted

b. With both Control Room Emergency Ventilation Trains inoperable, except as specified in ACTION c., immediately suspend the movement of fuel assemblies within the spent fuel pool ~~and the movement of shielded casks over the spent fuel pool cask laydown area~~. Restore at least one inoperable train to OPERABLE status within 1 hour, or be in HOT STANDBY within the next 6 hours, and COLD SHUTDOWN within the following 30 hours.

Deleted

c. With both Control Room Emergency Ventilation Trains inoperable due to an inoperable Control Room boundary, immediately suspend the movement of included fuel assemblies within the spent fuel pool ~~and the movement of shielded casks over the spent fuel pool cask laydown area~~. Restore the Control Room boundary to OPERABLE status within 24 hours or be in HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

---

* The Control Room boundary may be opened intermittently under administrative control.

LIMITING CONDITION FOR OPERATION

ACTION (continued)

Replace with "During irradiated fuel movement within containment or the spent fuel pool"

MODES 5 and 6, and all other times**

d. With one Control Room Emergency Ventilation Train inoperable, restore the inoperable train to OPERABLE status within 7 days. After 7 days, either initiate and maintain operation of the remaining OPERABLE Control Room Emergency Ventilation Train in the recirculation mode of operation, or immediately suspend CORE ALTERATIONS, and the movement of irradiated fuel assemblies~~, and the movement of shielded casks over the spent fuel pool cask laydown area~~.

e. With both Control Room Emergency Ventilation Trains inoperable, or with the OPERABLE Control Room Emergency Ventilation Train required to be in the recirculation mode by ACTION d. not capable of being powered by an OPERABLE normal and emergency power source, immediately suspend CORE ALTERATIONS, and the movement of irradiated fuel assemblies~~, and the movement of shielded casks over the spent fuel pool cask laydown area~~.

** In MODES 5 and 6, when a Control Room Emergency Ventilation Train is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of 3.7.6.1 Limiting Condition for Operation, provided: (1) its corresponding normal or emergency power source is OPERABLE; and (2) all of its redundant system (s), subsystem (s), train (s), component (s) and device(s) are OPERABLE, or likewise satisfy the requirements of the specification. Unless both conditions (1) and (2) are satisfied within 2 hours, then ACTION 3.7.6.1.d or 3.7.6.1.e shall be invoked as applicable.

4.7.6.1 Each Control Room Emergency Ventilation Train shall be demonstrated OPERABLE:

a. At least once per 12 hours by verifying that the control room air temperature is $\leq$ 100°F.

b. At least once per 31 days on a STAGGERED TEST BASIS by initiating from the control room, flow through the HEPA filters and charcoal absorber train and verifying that the train operates for at least 15 minutes.

c. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the train by:

   1. Verifying that the cleanup train satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the train flow rate is 2500 cfm $\pm$ 10%.

   2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.* The carbon sample shall have a removal efficiency of $\geq$ 95 percent.

   3. Verifying a train flow rate of 2500 cfm $\pm$ 10% during train operation when tested in accordance with ANSI N510-1975.

d. After every 720 hours of charcoal adsorber operation by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.*

---

* ASTM D3803-89 shall be used in place of ANSI N509-1976 as referenced in table 2 of Regulatory Guide 1.52. The laboratory test of charcoal should be conducted at a temperature of 30°C and a relative humidity of 95% within the tolerances specified by ASTM D3803-89.

SURVEILLANCE REQUIREMENTS (Continued)

e. At least once per 18 months by:

1. Verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 3.4 inches Water Gauge while operating the train at a flow rate of 2500 cfm ± 10%.

2. Verifying that on a recirculation signal, with the Control Room Emergency Ventilation Train operating in the normal mode and the smoke purge mode, the train automatically switches into a recirculation mode of operation with flow through the HEPA filters and charcoal adsorber banks.

Info Only

SURVEILLANCE REQUIREMENTS (Continued)

3. Verifying that control room air in-leakage is less than 130 SCFM with the Control Room Emergency Ventilation System operating in the recirculation/filtration mode.

f. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the train at a flow rate of 2500 cfm ± 10%.

g. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove greater than or equal to 99% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the train at a flow rate of 2500 cfm ± 10%.

Info Only

April 28, 2000

REFUELING OPERATIONS

DECAY TIME

LIMITING CONDITION FOR OPERATION

3.9.3.1 The reactor shall be subcritical for a minimum of 150 hours prior to movement of irradiated fuel in the reactor pressure vessel.

APPLICABILITY: MODE 6.

ACTION:

With the reactor subcritical for less than 150 hours, suspend all operations involving movement of irradiated fuel in the reactor pressure vessel.

SURVEILLANCE REQUIREMENTS

4.9.3.1 The reactor shall be determined to have been subcritical for at least 150 hours by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor pressure vessel.

REFUELING OPERATIONS

CONTAINMENT PENETRATIONS

LIMITING CONDITION FOR OPERATION

or capable of being closed

3.9.4 The containment penetrations shall be in the following status:

a. The equipment door closed and held in place by a minimum of four bolts

Deleted

Replace with "under administrative control*"

b. The personnel air lock shall be either:

1. closed by one personnel air lock door, or

2. capable of being closed by an OPERABLE personnel air lock door, under administrative control*, with containment purge in operation, and

Deleted

Deleted

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Closed by a manual or automatic isolation valve, blind flange, or equivalent, or

Replace with "under administrative control.*"

2. Be capable of being closed by an OPERABLE Containment Purge Valve Isolation System.

APPLICABILITY: During CORE ALTERATIONS. Deleted

During movement of irradiated fuel assemblies within containment.

ACTION:

Deleted

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or movement of irradiated fuel in the containment.

assemblies

SURVEILLANCE REQUIREMENTS

Replace with "Deleted"

4.9.4.1 Verify each required containment penetration is in the required status at least once per 7 days.

4.9.4.2 Verify each required containment purge valve actuates to the isolation position on an actual or simulated actuation signal at least once per 18 months.

Insert C

Insert C to Page 3/4 9-4

* Administrative controls shall ensure that appropriate personnel are aware that the equipment door, personnel air lock door and/or other containment penetrations are open, and that a specific individual(s) is designated and available to close the equipment door, personnel air lock door and/or other containment penetrations within 30 minutes if a fuel handling accident occurs. Any obstructions (e.g. cables and hoses) that could prevent closure of the equipment door, a personnel air lock door and/or other containment penetration must be capable of being quickly removed.

SHUTDOWN COOLING AND COOLANT CIRCULATION - HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

3.9.8.1 One shutdown cooling train shall be OPERABLE and in operation.

NOTE

1. The required shutdown cooling train may not be in operation for up to 1 hour per 8 hour period provided no operations are permitted that would cause a reduction in Reactor Coolant System boron concentration.

2. The normal or emergency power source may be inoperable for the required shutdown cooling train.

3. The shutdown cooling pumps may be removed from operation during the time required for local leak rate testing of containment penetration number 10 or to permit maintenance on valves located in the common SDC suction line, provided:

   a. No operations are permitted that would cause reduction of the Reactor Coolant System boron concentration,

   b. CORE ALTERATIONS are suspended, and

   c. Containment penetrations are in the following status:

      1) The equipment door is closed and secured with at least four bolts; and

      2) At least one personnel air lock door is closed; and

      3) Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

         Delete

         a) Closed with a manual or automatic isolation valve, blind flange, or equivalent, or

         Delete

         b) Be capable of being closed by an OPERABLE Containment Purge Valve Isolation System.

APPLICABILITY: MODE 6 with the water level ≥ 23 feet above the top of the reactor vessel flange.

SHUTDOWN COOLING AND COOLANT CIRCULATION - HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

ACTION:

With no shutdown cooling train OPERABLE or in operation, perform the following actions:

a. Immediately suspend all operations involving a reduction in Reactor Coolant System boron concentration and the loading of irradiated fuel assemblies in the core; and

b. Immediately initiate action to restore one shutdown cooling train to OPERABLE status and operation; and

c. Within 4 hours place the containment penetrations in the following status:

   1. Close the equipment door and secure with at least four bolts; and

   2. Close at least one personnel air lock door; and

   3. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

      Deleted a. Closed with a manual or automatic isolation valve, blind flange, or equivalent, or

      b. Be capable of being closed by an OPERABLE Containment Purge Valve Isolation System.

Deleted

SURVEILLANCE REQUIREMENTS

4.9.8.1 One shutdown cooling train shall be verified to be in operation and circulating reactor coolant at a flow rate greater than or equal to 1000 gpm at least once per 12 hours.

SHUTDOWN COOLING AND COOLANT CIRCULATION - LOW WATER LEVEL

LIMITING CONDITION FOR OPERATION

3.9.8.2 Two shutdown cooling trains shall be OPERABLE and one shutdown cooling train shall be in operation.

NOTE
The normal or emergency power source may be inoperable for each shutdown cooling train.

APPLICABILITY: MODE 6 with the water level < 23 feet above the top of the reactor vessel flange.

ACTION:

a. With one shutdown cooling train inoperable, immediately initiate action to restore the shutdown cooling train to OPERABLE status OR immediately initiate action to establish $\geq$ 23 feet of water above the top of the reactor vessel flange.

b. With no shutdown cooling train OPERABLE or in operation, perform the following actions:

1. Immediately suspend all operations involving a reduction in Reactor Coolant System boron concentration; and

2. Immediately initiate action to restore one shutdown cooling train to OPERABLE status and operation; and

3. Within 4 hours place the containment penetrations in the following status:

a) Closed the equipment door and secure with at least four bolts; and

b) Close at least one personnel air lock door; and

c) Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either: Deleted

Deleted 1) closed with a manual or automatic isolation valve, blind flange, or equivalent. or Deleted

2) Be capable of being closed by an OPERABLE Containment Purge Valve Isolation System. Deleted

SURVEILLANCE REQUIREMENTS

4.9.8.2.1 One shutdown cooling train shall be verified to be in operation and circulating reactor coolant at a flow rate greater than or equal to 1000 gpm at least once per 12 hours.

4.9.8.2.2 The required shutdown cooling pump, if not in operation, shall be determined OPERABLE once per 7 days by verifying correct breaker alignment and indicated power available.

Info Only

January 11, 2002

LIMITING CONDITION FOR OPERATION

3.9.11 As a minimum, 23.0 feet of water shall be maintained over the top of the reactor vessel flange.

APPLICABILITY: During CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts.

During movement of irradiated fuel assemblies within containment.

ACTION:

With the water level less than that specified above, immediately suspend CORE ALTERATIONS and immediately suspend movement of irradiated fuel assemblies within containment.

SURVEILLANCE REQUIREMENTS

4.9.11 The water level shall be determined to be within its minimum depth at least once per 24 hours.

Info Only

August 1, 1975

STORAGE POOL WATER LEVEL

LIMITING CONDITION FOR OPERATION

3.9.12 As a minimum, 23 feet of water shall be maintained over the top of irradiated fuel assemblies seated in the storage racks.

APPLICABILITY: WHENEVER IRRADIATED FUEL ASSEMBLIES ARE IN THE STORAGE POOL.

ACTION:

With the requirement of the specification not satisfied, suspend all movement of fuel and spent fuel pool platform crane operations with loads in the fuel storage areas.

SURVEILLANCE REQUIREMENTS

4.9.12 The water level in the storage pool shall be determined to be within its minimum depth at least once per 7 days when irradiated fuel assemblies are in the fuel storage pool.

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STORAGE POOL AREA VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.9.15 The Storage Pool Area Ventilation System shall be OPERABLE with at least one OPERABLE Enclosure Building Filtration Train operating in the auxiliary exhaust mode and exhausting through the HEPA filters and charcoal adsorbers with spent fuel pool area integrity maintained, except during normal entry and egress through spent fuel pool area access doors.

APPLICABILITY: During fuel movement within the spent fuel pool when irradiated fuel assemblies that have decayed less than 60 days are located within the spent fuel pool.

During movement of a shielded cask over the spent fuel pool cask laydown area.

ACTION:

a. With no OPERABLE Enclosure Building Filtration Train operating in the auxiliary exhaust mode and exhausting through the HEPA filters and charcoal adsorbers, immediately suspend all operations involving fuel movement within the spent fuel pool and immediately suspend movement of a shielded cask over the spent fuel pool cask laydown area.

b. With a loss of spent fuel pool area integrity, except as a result of normal entry and egress through spent fuel pool area access doors, immediately suspend all operations involving fuel movement within the spent fuel pool and immediately suspend movement of a shielded cask over the spent fuel pool cask laydown area.

SURVEILLANCE REQUIREMENTS

4.9.15.1 The above required Enclosure Building Filtration Train shall be demonstrated OPERABLE:

a. At least once per 31 days by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that the train operates for at least 10 hours with the heaters on.

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the train by:

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SURVEILLANCE REQUIREMENTS (Continued)

1. Verifying that the cleanup train satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the train flow rate is 9000 cfm ± 10%.

2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.*

3. Verifying a train flow rate of 9000 cfm ± 10% during train operation when tested in accordance with ANSI N510-1975.

c. After every 720 hours of charcoal adsorber operation by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.*

d. At least once per 18 months by verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is ≤ 2.6 inches Water Gauge while operating the train at a flow rate of 9000 cfm ± 10%.

e. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove greater than or equal to 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the train at a flow rate of 9000 cfm ± 10%.

* ASTM D3803-89 shall be used in place of ANSI N509-1976 as referenced in table 2 of Regulatory Guide 1.52. The laboratory test of charcoal should be conducted at a temperature of 30°C and a relative humidity of 95% within the tolerances specified by ASTM D3803-89. Additionally, the charcoal sample shall have a removal efficiency of ≥ 95%.

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SURVEILLANCE REQUIREMENTS (Continued)

f. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove greater than or equal to 99% of a halogenated hydrocarbon refrigerant test gas when they are tested in place in accordance with ANSI N510-1975 while operating the train at a flow rate of 9000 cfm ± 10%.

4.9.15.2 The OPERABLE Enclosure Building Filtration Train shall be verified to be operating in the auxiliary exhaust mode and exhausting through the HEPA filters and charcoal adsorbers at least once per 12 hours during either fuel movement within the spent fuel pool or movement of a shielded cask over the spent fuel pool cask laydown area.

4.9.15.3 Each door in all spent fuel pool area access openings shall be verified closed, except when being used for normal entry and egress, at least once per 12 hours during either fuel movement within the spent fuel pool or movement of a shielded cask over the spent fuel pool cask laydown area.

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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3/4.3.3 MONITORING INSTRUMENTATION

3/4.3.3.1 RADIATION MONITORING INSTRUMENTATION

The OPERABILITY of the radiation monitoring channels ensures that 1) the radiation levels are continually measured in the areas served by the individual channels and 2) the alarm or automatic action is initiated when the radiation level trip setpoint is exceeded.

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The spent fuel storage area monitors provide a signal to direct the ventilation exhaust from the spent fuel storage area through a filter train when the dose rate exceeds the setpoint. The filter train is provided to reduce the particulate and iodine radioactivity released to the atmosphere. However, neither the analysis of a fuel handling accident or the analysis of a spent fuel cask drop accident in the spent fuel storage area credit automatic diversion of the spent fuel storage area ventilation exhaust through an enclosure building filtration train for accident mitigation.

The spent fuel storage area radiation monitors will detect an increase in radiation levels due to a lowering of spent fuel pool water level. This will provide additional indication to the plant operators of an unexpected decrease in spent fuel pool water level.

The containment airborne radiation monitors (gaseous and particulate) provide early indication of leakage from the Reactor Coolant System as specified in Technical Specification 3.4.6.1. In addition, these radiation monitors will initiate automatic closure of the containment purge valves upon detection of high airborne radioactivity levels inside containment. The requirements for the automatic closure of the containment purge valves is addressed by Technical Specification 3.3.4

The maximum allowable trip value for these monitors corresponds to calculated concentrations at the site boundary which would not exceed the concentrations listed in 10 CFR Part 20, Appendix B, Table II. Exposure for a year to the concentrations in 10 CFR Part 20, Appendix B. Table corresponds to a total body dose to an individual of 500 mrem which is well below the guidelines of 10 CFR Part 100 for an individual at any point on the exclusion area boundary for two hours.

Determination of the monitor's trip value in counts per minute, which is the actual instrument response, involves several factors including: 1) the atmospheric dispersion (x/Q), 2) isotopic composition of the sample, 3) sample flow rate, 4) sample collection efficiency, 5) counting efficiency, and 6) the background radiation level at the detector. The x/Q of 5.8×10^{-6} sec/m^3 is the highest annual average x/Q estimated for the site boundary (0.48 miles in the NE sector) for vent releases from the containment and 7.5×10^{-8} sec/m^3 is the highest annual average x/Q estimated for an off-site location (3 miles in the NNE sector) for releases from the Unit I stack. This calculation also assumes that the isotopic composition is xenon-133 for gaseous radioactivity and cesium-137 for particulate radioactivity (Half Lives greater than 8 days). The upper limit of 5×10^5 cpm is approximately 90 percent of full instrument scale.

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3/4.3.4 Containment Purge Valve Isolation Signal Deleted

The containment purge valve may remain open during CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment provided the automatic closure of the purge valves on high containment radiation is OPERABLE. A high airborne radioactivity level inside containment will be detected by the containment airborne radiation monitors (gaseous and particulate). The actuation logic for this function is one out of four. High radioactivity inside containment, detected by any one of the four radiation detectors (two gaseous and two particulate), will automatically isolate containment purge.

An OPERABLE system capable of generating a Containment Purge Valve Isolation Signal consists of at least one containment gaseous radiation monitor channel, at least one containment particulate radiation monitor channel, and the associated automatic actuation logic train. An actuation logic train consists of the detectors, sensor channels, and logic circuits up to and including the Engineered Safeguards Actuation System actuation module.

The analysis of a fuel handling accident inside containment credits automatic isolation of containment purge. Therefore, this function is required to be OPERABLE if the containment purge valves are to remain open during CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment. If this automatic isolation function is not OPERABLE, the containment purge valves must be maintained closed to perform CORE ALTERATIONS or the movement of irradiated fuel assemblies inside containment.

The ACTION requirements to immediately suspend CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment, or to immediately close the containment purge valves and maintain them closed, does not preclude completion of the movement of a component to a safe position.

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These radiation monitors provide an automatic closure signal to the containment purge valves upon detection of high airborne radioactivity levels inside containment. The maximum allowable trip value for these monitors corresponds to calculated concentrations at the site boundary which would not exceed the concentrations listed in 10 CFR Part 20, Appendix B, Table II. Exposure for a year to the concentrations in 10 CFR Part 20, Appendix B, Table II, corresponds to a total body dose to an individual of 500 mrem, which is well below the guidelines of 10 CFR Part 100 for an individual at any point on the exclusion area boundary for two hours.

Determination of the monitor's trip value in counts per minute, which is the actual instrument response, involves several factors including: 1) the atmospheric dispersion (x/Q), 2) isotopic composition of the sample, 3) sample flow rate, 4) sample collection efficiency, 5) counting efficiency, and 6) the background radiation level at the detector. The x/Q of 5.8×10^{-6} sec/m^3 is the highest annual average x/Q estimated for the site boundary (0.48 miles in the NE sector) for vent releases from the containment and 7.5×10^{-8} sec/m^3 is the highest annual average x/Q estimated for an off-site location (3 miles in the NNE sector) for releases from the Unit 1 stack. This calculation also assumes that the isotopic composition is xenon-133 for gaseous radioactivity and cesium-137 for particulate radioactivity (Half Lives greater than 8 days). The upper limit of 5×10^5 cpm is approximately 90 percent of full instrument scale.

3/4.6.3 CONTAINMENT ISOLATION VALVES (continued)
2-MS-201 is maintained energized, so it can be closed from the control room, if necessary, for containment isolation. However, 2-MS-202 is deenergized open by removing power to the valve's motor via a lockable disconnect switch to satisfy Appendix R requirements. Therefore, 2-MS-202 cannot be closed immediately from the control room, if necessary, for containment isolation. The disconect switch key to power for 2-MS-202 is stored in the Unit 2 control room, and can be used to re-power the valve at the MCC; this will allow the valve to be closed from the control room. It is not necessary to maintain a dedicated operator at 2-MS-202 because this valve is already in the required accident position. Also, the steam that passes through this valve should not contain any radioactivity. The steam generators provide the barrier between the containment and the atmosphere. Therefore, it would take an additional structural failure for radioactivity to be released to the environment through this valve.

Steam generator chemical addition valves, 2-FW-15A and 2-FW-15B, are opened to add chemicals to the steam generators using the Auxiliary Feedwater System (AFW). When either 2-FW-15A or 2-FW-15B is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of these valves is expected during plant startup and shutdown.

The bypasses around the main steam supplies to the turbine driven auxiliary feedwater pump (2-MS-201 and 2-MS-202), 2-MS-458 and 2-MS-459, are opened to drain water from the steam supply lines. When either 2-MS-458 or 2-MS-459 is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of these valves is expected during plant startup.

The containment station air header isolation, 2-SA-19, is opened to supply station air to containment. When 2-SA-19 is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of this valve is only expected for maintenance activities inside containment.

The backup air supply master stop, 2-IA-566, is opened to supply backup air to 2-CH-517, 2-CH-518, 2-CH-519, 2-EB-88, and 2-EB-89. When 2-IA-566 is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of this valve is only expected in response to a loss of the normal air supply to the valves listed.

The nitrogen header drain valve, 2-SI-045, is opened to depressurize the containment side of the nitrogen supply header stop valve, 2-SI-312. When 2-SI-045 is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of this valve is only expected after using the high pressure nitrogen system to raise SIT nitrogen pressure.

The containment waste gas header test connection isolation valve, 2-GR-63, is opened to sample the primary drain tank for oxygen and nitrogen. When 2-GR-63 is opened, a dedicated operator, in continuous communication with the control room, is required. Operation of this valve is expected during plant startup and shutdown.

3/4.6.3 CONTAINMENT ISOLATION VALVES (continued)

The upstream vent valves for the steam generator atmospheric dump valves, 2-MS-369 and 2-MS-371, are opened during steam generator safety valve set point testing to allow steam header pressure instrumentation to be placed in service. When either 2-MS-369 or 2-MS-371 is opened, a dedicated operator in continuous communication with the control room is required.

The determination of the appropriate administrative controls for these containment isolation valves included an evaluation of the expected environmental conditions. This evaluation has concluded environmental conditions will not preclude access to close the valve, and this action will prevent the release of radioactivity outside of containment through the respective penetration.

The containment purge supply and exhaust isolation valves are required to be sealed closed during plant operation since these valves have not been demonstrated capable of closing during a LOCA or steam line break accident. Such a demonstration would require justification of the mechanical operability of the purge valves and consideration of the appropriateness of the electrical override circuits. Maintaining these valves closed during plant operations ensures that excessive quantities of radioactive materials will not be released via the containment purge system. The containment purge supply and exhaust isolation valves are sealed closed by removing power from the valves. This is accomplished by pulling the control power fuses for each of the valves. The associated fuse blocks are then locked. This is consistent with the guidance contained in NUREG-0737 Item II.E.4.2 and Standard Review Plan 6.2.4, "Containment Isolation System," Item II.f.

3/4.7.4 SERVICE WATER SYSTEM (Continued)

The Technical Specification Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the accident analysis are met and that subsystem OPERABILITY is maintained. The purpose of the service water pumps differential pressure test, Surveillance Requirement 4.7.4.1.a.2, a substantial flow test, is to ensure that the pumps have not degraded to a point where the accident analysis would be adversely impacted. The surveillance requirement acceptance criteria for the service water pumps was developed assuming a 7% degraded pump from the actual pump curves. Flow and pressure measurement instrument inaccuracies for the service water pumps have been accounted for in the design basis hydraulic analysis. It is not necessary to account for flow and pressure measurement instrument inaccuracies in the acceptance criteria contained in the surveillance procedure.

3/4.7.5 FLOOD LEVEL

The service water pump motors are normally protected against water damage to an elevation of 22 feet. If the water level is exceeding plant grade level or if a severe storm is approaching the plant site, one service water pump motor will be protected against flooding to a minimum elevation of 28 feet to ensure that this pump will continue to be capable of removing decay heat from the reactor. In order to ensure operator accessibility to the intake structure action to provide pump motor protection will be initiated when the water level reaches plant grade level.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

The OPERABILITY of the Control Room Emergency Ventilation System ensures that 1) the ambient air temperature does not exceed the allowable temperature for continuous duty rating for the equipment and instrumentation cooled by this system and 2) the control room will remain habitable for operations personnel during and following all credible accident conditions. Insert E

The OPERABILITY of this system in conjunction with control room design provisions is based on limiting the radiation exposure to personnel occupying the control room to 5 rem or less whole body, or its equivalent. This limitation is consistent with the requirements of General Design Criteria 19 of Appendix "A", 10 CFR 50.

The LCO is modified by a footnote allowing the control room boundary to be opened intermittently under administrative controls. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls consist of stationing a dedicated individual at the opening who is in constant communication with the control room. This individual will have a method to rapidly close the opening when a need for control room isolation is indicated.

The control room radiological dose calculations use the conservative minimum acceptable flow of 2250 cfm based on the flowrate surveillance requirement of 2500 cfm ± 10%.

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The OPERABILITY of this system in conjunction with control room design provisions is based on limiting the radiation exposure to personnel occupying the control room. For all postulated design basis accidents except a Fuel Handling Accident, the radiation exposure to personnel occupying the control room shall be 5 rem or less whole body consistent with the requirements of General Design Criterion 19 of Appendix "A," 10 CFR 50. For a Fuel Handling Accident, the radiation exposure to personnel occupying the control room shall be 5 rem TEDE or less consistent with the requirements of 10 CFR 50.67.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM (Continued)

Currently there are some situations where the CREV System may not automatically start on an accident signal, without operator action. Under most situations, the emergency filtration fans will start and the CREV System will be in the accident lineup. However, a failure of a supply fan (F21A or B) or an exhaust fan (F31A or B), operator action will be required to return to a full train lineup. Also, if a single emergency bus does not power up for one train of the CREV System, the opposite train filter fan will automatically start, but the required supply and exhaust fans will not automatically start. Therefore, operator action is required to establish the whole train lineup. This action is specified in the Emergency Operating Procedures. The radiological dose calculations do not take credit for CREV System cleanup action until 10 minutes into the accident to allow for operator action.

When the CREV System is checked to shift to the recirculation mode of operation, this will be performed from the normal mode of operation, and from the smoke purge mode of operation.

With both control room emergency ventilation trains inoperable due to an inoperable control room boundary, the movement of irradiated fuel assemblies within the ~~spent fuel pool and the movement of shielded casks over the spent fuel pool cask laydown area~~ must be immediately suspended. The control room boundary must be restored to OPERABLE status within 24 hours, or the unit must be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Deleted

If the control room boundary is inoperable in MODES 1, 2, 3, and 4, the control room emergency ventilation trains cannot perform their intended functions. Actions must be taken to restore an OPERABLE control room boundary within 24 hours. During the period that the control room boundary is inoperable, appropriate compensatory measures (consistent with the intent of GDC 19) should be utilized to protect control room operators from potential hazards such as radioactive contamination, toxic chemicals, smoke, temperature and relative humidity, and physical security. Preplanned measures should be available to address these concerns for intentional and unintentional entry into this condition. The 24 hour allowed outage time is reasonable based on the low probability of a DBA occurring during this time period, and the use of compensatory measures. The 24 hour allowed outage time is a typically reasonable time to diagnose, plan, and possibly repair, and test most problems with the control room boundary.

Surveillance Requirement 4.7.6.1.c.1 dictates the test frequency, methods and acceptance criteria for the Control Room Emergency Ventilation System trains (cleanup trains). These criteria all originate in the Regulatory Position sections of Regulatory Guide 1.52, Rev. 2, March 1978 as discussed below.

Section C.5.a requires a visual inspection of the cleanup system be made before the following tests, in accordance with the provisions of section 5 of ANSI N510-1975:

- in-place air flow distribution test
- DOP test
- activated carbon adsorber section leak test

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM (Continued)

Section C.5.c requires the in-place Dioctyl phthalate (DOP) test for HEPA filters to conform to section 10 of ANSI N510-1975. The HEPA filters should be tested in place (1) initially, (2) at least once per 18 months thereafter, and (3) following painting, fire, or chemical release in any ventilation zone communicating with the system. The testing is to confirm a penetration of less than 0.05%* at rated flow. A filtration system satisfying this criteria can be considered to warrant a 99% removal efficiency for particulates.

Section C.5.d requires the charcoal adsorber section to be leak tested with a gaseous halogenated hydrocarbon refrigerant, in accordance with section 12 of ANSI N510-1975 to ensure that bypass leakage through the adsorber section is less than 0.05%.** Adsorber leak testing should be conducted (1) initially, (2) at least once per 18 months thereafter, (3) following removal of an adsorber sample for laboratory testing if the integrity of the adsorber section is affected, and (4) following painting, fire, or chemical release in any ventilation zone communicating with the system.

irradiated Deleted

The ACTION requirements to immediately suspend various activities (CORE ALTERATIONS, fuel movement, shielded cask movement, etc.) do not preclude completion of the movement of a component to a safe position.

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* Means that the HEPA filter will allow passage of less than 0.05% of the test concentration injected at the filter inlet from a standard DOP concentration injection.

** Means that the charcoal adsorber sections will allow passage of less than 0.05% of the injected test concentration around the charcoal adsorber sections.

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Technical Specification 3.7.6.1 provides the OPERABILITY requirements for the Control Room Emergency Ventilation Trains. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable in MODES 1, 2, 3, or 4 the requirements of Technical Specification 3.0.5 apply in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable in MODES 5 or 6 the guidance provided by Note "**" of this specification applies in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable while not in MODES 1, 2, 3, 4, 5, or 6 the requirements of Technical Specification 3.0.5 apply in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

3/4.9.4 CONTAINMENT PENETRATIONS

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The requirements on containment penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

Both containment personnel airlock doors can be open during CORE ALTERATIONS and the movement of irradiated fuel assemblies inside containment provided the following conditions are met:

1. Containment purge is in operation providing air flow through the personnel air lock into containment.

2. At least one personnel air lock door is under administrative control such that the door can be closed within 10 minutes, which is the assumed containment purge isolation time. This will allow hoses and cables to be run through the personnel air lock, provided they can be rapidly removed to allow the door to be closed within the required time period. In addition, a designated individual must be continuously available for door closure.

3/4.9.5 DELETED

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The requirements on containment penetration closure and OPERABILITY ensure that a release of radioactive material within containment to the environment will be minimized. The OPERABILITY, closure restrictions, and administrative controls are sufficient to minimize the release of radioactive material from a fuel element rupture based upon the lack of containment pressurization potential during the movement of irradiated fuel assemblies within containment. The containment purge valves are containment penetrations and must satisfy all requirements specified for a containment penetration.

Containment penetrations, including the personnel airlock doors and equipment door, can be open during the movement of irradiated fuel provided that sufficient administrative controls are in place such that any of these containment penetrations can be closed within 30 minutes. Following a Fuel Handling Accident, each penetration, including the equipment door, is closed such that a containment atmosphere boundary can be established. However, if it is determined that closure of all containment penetrations would represent a significant radiological hazard to the personnel involved, the decision may be made to forgo the closure of the affected penetration(s). The containment atmosphere boundary is established when any penetration which provides direct access to the outside atmosphere is closed such that at least one barrier between the containment atmosphere and the outside atmosphere is established. Additional actions beyond establishing the containment atmosphere boundary, such as installing flange bolts for the equipment door or a containment penetration, are not necessary.

Administrative controls for opening a containment penetration require that one or more designated persons, as needed, be available for isolation of containment from the outside atmosphere. Procedural controls are also in place to ensure cables or hoses which pass through a containment opening can be quickly removed. The location of each cable and hose isolation device for those cables and hose which pass through a containment opening is recorded to ensure timely closure of the containment boundary. Additionally, a closure plan is developed for each containment opening which includes an estimated time to close the containment opening. A log of personnel designated for containment closure is maintained, including identification of which containment openings each person has responsibility for closing. As necessary, equipment will be pre-staged to support timely closure of a containment penetration.

Prior to opening a containment penetration, a review of containment penetrations currently open is performed to verify that sufficient personnel are designated such that all containment penetrations can be closed within 30 minutes. Designated personnel may have other duties, however, they must be available such that their assigned containment openings can be closed within 30 minutes. Additionally, each new work activity inside containment is reviewed to consider its effect on the closure of the equipment door, personnel air lock, and/or other open containment penetrations. The required number of designated personnel are continuously available to perform closure of their assigned containment openings whenever irradiated fuel is being moved within the containment.

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(Pg. 2 of 2)

Administrative controls are also in place to ensure that the containment atmosphere boundary is established if adverse weather conditions which could present a potential missile hazard threaten the plant. Weather conditions are monitored during irradiated fuel movement whenever a containment penetration, including the equipment door and personnel airlock door, is open and a storm center is within the plant monitoring radius of 150 miles.

The administrative controls ensure that the containment atmosphere boundary can be quickly established (i.e. within 30 minutes) upon determination that adverse weather conditions exist which pose a significant threat to the Millstone Site. A significant threat exists when a hurricane warning or tornado warning is issued which applies to the Millstone Site, or if an average wind speed of 60 miles an hour or greater is recorded by plant meteorological equipment at the meteorological tower. If the meteorological equipment is inoperable, information from the National Weather Service can be used as a backup in determining plant wind speeds. Closure of containment penetrations, including the equipment door and personnel airlock door, begin immediately upon determination that a significant threat exists.

When severe weather conditions which could generate a missile are within the plant monitoring radius, containment and spent fuel pool penetrations are closed to establish the containment atmosphere boundary.

3/4.9.8 SHUTDOWN COOLING AND COOLANT CIRCULATION (Continued)

a refueling outage until after the completion of the fuel shuffle such that approximately one third of the reactor core will contain new fuel. By waiting until the completion of the fuel shuffle, sufficient time (at least 14 days from reactor shutdown) will have elapsed to ensure the limited SDC flow rate specified for this alternate lineup will be adequate for decay heat removal from the reactor core and the spent fuel pool. In addition, CORE ALTERATIONS shall be suspended when using this alternate flow path, and this flow path should only be used for short time periods, approximately 12 hours. If the alternate flow path is expected to be used for greater than 24 hours, or the decay heat load will not be bounded as previously discussed, further evaluation is required to ensure that this alternate flow path is acceptable.

These alternate lineups do not affect the OPERABILITY of the SDC train. In addition, these alternate lineups will satisfy the requirement for a SDC train to be in operation if the minimum required SDC flow through the reactor core is maintained.

In MODE 6, with the refueling cavity filled to ≥ 23 feet above the reactor vessel flange, both SDC trains may not be in operation for up to 1 hour in each 8 hour period, provided no operations are permitted that would cause a reduction in RCS boron concentration. Boron concentration reduction is prohibited because uniform concentration distribution cannot be ensured without forced circulation. This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, and RCS to SDC isolation valve testing. During this 1 hour period, decay heat is removed by natural convection to the large mass of water in the refueling pool.

In MODE 6, with the refueling cavity filled to ≥ 23 feet above the reactor vessel flange, both SDC trains may also not be in operation for local leak rate testing of the SDC cooling suction line (containment penetration number 10) or to permit maintenance on valves located in the common SDC suction line. This will allow the performance of required maintenance and testing that otherwise may require a full core offload. In addition to the requirement prohibiting operations that would cause a reduction in RCS boron concentration, CORE ALTERATIONS are suspended and all containment penetrations providing direct access from the containment atmosphere to outside atmosphere must be closed ~~or capable of being closed by an OPERABLE Containment Purge Valve Isolation System~~. Delete No time limit is specified to operate in this configuration. However, factors such as scope of the work, decay heat load/heatup rate, and RCS temperature should be considered to determine if it is feasible to perform the work. Prior to using this provision, a review and approval of the evolution by the SORC is required. This review will evaluate current plant conditions and the proposed work to determine if this provision should be used, and to establish the termination criteria and appropriate contingency plans. During this period, decay heat is removed by natural convection to the large mass of water in the refueling pool.

Insert H

The requirement that at least one shutdown cooling loop be in operation at ≥ 1000 gpm ensures that (1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F as required during the REFUELING MODE, (2) sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification, and (3) is consistent with boron

INSERT H to Page B 3/4 9-2a

The containment purge valves are containment penetrations and must satisfy all requirements specified for a containment penetration.

3/4.9.8 SHUTDOWN COOLING AND COOLANT CIRCULATION (Continued)

dilution analysis assumptions. The 1000 gpm shutdown cooling flow limit is the minimum analytical limit. Plant operating procedures maintain the minimum shutdown cooling flow at a higher value to accommodate flow measurement uncertainties.

Average Coolant Temperature (T_{avg}) values are derived under shutdown cooling conditions, using the designated formula for use in Unit 2 operating procedures.

- SDC flow greater than 1000 gpm: $(SDC_{outlet} + SDC_{inlet}) / 2 = T_{avg}$

During SDC only operation, there is no significant flow past the loop RTDs. Core inlet and outlet temperatures are accurately measured during those conditions by using T351Y, SDC return to RCS temperature indication, and T351X, RCS to SDC temperature indication. The average of these two indicators provides a temperature that is equivalent to the average RCS temperature in the core.

T351X will not be available when using the alternate SDC suction flow path from the SFP. Substitute temperature monitoring capability shall be established to provide indication of reactor core outlet temperature. A portable temperature device can be used to indicate reactor core outlet temperature. Indication of reactor core outlet temperature from this temporary device shall be readily available to the control room personnel. A remote television camera or an assigned individual are acceptable alternative methods to provide this indication to control room personnel.

3/4.9.9 and 3/4.9.10 DELETED

3/4.9.11 and 3/4.9.12 WATER LEVEL-REACTOR VESSEL AND STORAGE POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 10% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

~~May 1, 2002~~

3/4.9.13 DELETED

3/4.9.14 DELETED

3/4.9.15 STORAGE POOL AREA VENTILATION SYSTEM

Replace with "Deleted"

The limitations of this specification on the operation of the Storage Pool Area Ventilation System ensure that the radioactive material that could be released from irradiated fuel assemblies as a result of a fuel handling or shielded cask drop accident will be filtered through the HEPA filters and charcoal adsorber prior to discharge to the atmosphere. No credit is taken for automatic operation of this system, as a result of high spent fuel pool area radiation, to mitigate the consequences of these accidents. Therefore, the system must be in operation and exhausting through the HEPA filters and charcoal adsorber prior to fuel movement within the spent fuel pool when irradiated fuel assemblies that have decayed less than 60 days are located within the spent fuel pool, or during the movement of a shielded cask over the spent fuel pool cask laydown area.

An OPERABLE Enclosure Building Filtration Train operating in the auxiliary exhaust mode and exhausting through the HEPA filters and charcoal adsorber removes radioiodine from the Spent Fuel Pool area atmosphere following a fuel handling accident. After 60 days of decay, there is negligible radioiodine. Therefore, filtration is not necessary.

An OPERABLE Enclosure Building Filtration Train operating in the auxiliary exhaust mode and exhausting through the HEPA filters and charcoal adsorber removes radioactivity from the Spent Fuel Pool area atmosphere following a shielded cask drop accident. A shielded cask is a shielded container used for the transfer of irradiated (spent fuel, irradiated hardware, etc.) or radioactive (contaminated) materials. Filtration is required whenever a shielded cask is being moved over the spent fuel pool cask laydown area.

The ACTION requirements for this specification ensure that fuel movement within the spent fuel pool or shielded cask movement over the spent fuel pool cask laydown area will not occur unless an Enclosure Building Filtration Train is operating in the auxiliary exhaust mode. The ACTION requirement to suspend fuel movement within the storage pool and shielded cask movement over the cask laydown area does not preclude completion of the movement of a component to a safe position.

The requirements for spent fuel pool area integrity ensure that an Enclosure Building Filtration Train operating in the auxiliary exhaust mode collects and filters radioiodine following a fuel handling or shielded cask drop accident. Normal entry and egress through spent fuel pool area access doors is permitted and does not violate spent fuel pool area integrity. The acceptable access doors for normal entry and egress are designed to automatically close and latch after use. If a required door that is designed to automatically close and latch is not capable of automatically closing and latching, the door shall be maintained closed and latched, or personnel shall be stationed at the door to ensure that the door is closed and latched after each transit through the door. Otherwise, the access opening (door) should be declared inoperable and spent fuel pool area integrity will be violated. In addition, use of doors that are not designed for automatic closure (e.g., a roll-up door) will violate spent fuel pool area integrity.

The spent fuel pool area access doors and other openings, required to be closed, are listed in the Technical Requirements Manual.

The Millstone Unit No. 2 Auxiliary Building elevator shaft smoke/heat hole has been evaluated and determined to be an acceptable minor leakage pathway. Therefore, spent fuel pool area integrity is maintained, and the required Enclosure Building Filtration Train is OPERABLE, when the elevator shaft smoke/heat hole is open. 2-HV-171, Spent Fuel Pool Area Exhaust Damper, is not an acceptable bypass leakage path and must remain closed when necessary to maintain spent fuel pool area integrity.

The laboratory testing requirement for the charcoal sample to have a removal efficiency of $\geq$ 95% is more conservative than the elemental and organic iodine removal efficiencies of 90% and 70%, respectively, assumed in the DBA analyses for the EBFS charcoal adsorbers in the Millstone Unit 2 Final Safety Analysis Report. A removal efficiency acceptance criteria of $\geq$ 95% will ensure the charcoal has the capability to perform its intended safety function throughout the length of an operating cycle.

Surveillance Requirement 4.9.15.1.b.1 dictates the test frequency, method and acceptance criteria for the Storage Pool Area Ventilation System trains (cleanup trains). These criteria all originate in the Regulatory Position sections of Regulatory Guide 1.52, Rev. 2, March 1978 as discussed below:

Section C.5.a requires a visual inspection of the cleanup system be made before the following tests, in accordance with the provisions of section 5 of ANSI N510-1975:

- in-place air flow distribution test
- DOP test
- activated carbon adsorber section leak test

Section C.5.c requires the in-place Dioctyl phthalate (DOP) test for HEPA filters to conform to section 10 of ANSI N510-1975. The HEPA filters should be tested in place (1) initially, (2) at least once per 18 months thereafter, and (3) following painting, fire, or chemical release in any ventilation zone communicating with the system. The testing is to confirm a penetration of less than 0.05%* at rated flow. A filtration system satisfying this criteria can be considered to warrant a 99% removal efficiency for particulates.

Section C.5.d requires the charcoal adsorber section to be leak tested with a gaseous halogenated hydrocarbon refrigerant, in accordance with section 12 of ANSI N510-1975 to ensure that bypass leakage through the adsorber section is less than 0.05%.** Adsorber leak testing should be conducted (1) initially, (2) at least once per 18 months thereafter, (3) following removal of an

---

* Means that the HEPA filter will allow passage of less than 0.05% of the test concentration injected at the filter inlet from a standard DOP concentration injection.

** Means that the charcoal adsorber sections will allow passage of less than 0.05% of the injected test concentration around the charcoal adsorber sections.

TSCR 2-19-01
December 13, 2001
May 1, 2002

Delete!

adsorber sample for laboratory testing if the integrity of the adsorber section is affected, and (4) following painting, fire, or chemical release in any ventilation zone communicating with the system.

3/4.9.16 SHIELDED CASK

The limitations of this specification and 3/4.9.15 ensure that in the event of a shielded cask drop accident 1) the doses from ruptured fuel assemblies will be within the assumptions of the safety analyses, 2) K_{eff} will remain $\leq$ .95.

3/4.9.17 MOVEMENT OF FUEL IN SPENT FUEL POOL

The limitations of this specification ensure that in the event of a fuel handling accident involving a dropped, misplaced, or misloaded fuel assembly (or consolidated fuel storage box), the Keff of the spent fuel pool racks and fuel transfer carriage will remain less than or equal to 0.95.

3/4.9.18 SPENT FUEL POOL - REACTIVITY CONDITION

The limitations described by Figures 3.9-1a, 3.9-1b, and 3.9-3 ensure that the reactivity of fuel assemblies and consolidated fuel storage boxes, introduced into the Region C spent fuel racks, are conservatively within the assumptions of the safety analysis.

The limitations described by Figure 3.9-4 ensure that the reactivity of the fuel assemblies, introduced into the Region A spent fuel racks, are conservatively within the assumptions of the safety analysis.

Docket No. 50-336
B18763

Attachment 5

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Retyped Pages

INSTRUMENTATION

3/4.3.3 MONITORING INSTRUMENTATION

RADIATION MONITORING

LIMITING CONDITION FOR OPERATION

3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in Table 3.3-6, adjust the setpoint to within the limit within 2 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels inoperable, take the ACTION shown in Table 3.3-6. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the modes and at the frequencies shown in Table 4.3-3.

4.3.3.1.2 Deleted

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM/TRIP SETPOINT	MEASUREMENT RANGE	ACTION
1. AREA MONITORS					
a. Deleted					
b. Control Room Isolation	1	ALL MODES	2 mR/hr	10^{-1} - 10^{4} mR/hr	16
c. Containment High Range	1	1,2,3,&4	100 R/hr	10^{0} - 10^{8} R/hr	17
d. Noble Gas Effluent Monitor (high range) (Unit 2 stack)	1	1,2,3,&4	2 x 10^{-1} uci/cc	10^{-3} - 10^{5} uci/cc	17
2. PROCESS MONITORS					
a. Containment Atmosphere-Particulate	1	1,2,3,&4	NA	10 - 10^{+6} cpm	14
b. Containment Atmosphere-Gaseous	1	1,2,3,&4	NA	10 - 10^{+6} cpm	14

TABLE 3.3-6 (Continued)

TABLE NOTATION

(a) DELETED

ACTION 13 - Deleted

ACTION 14 - With the number of process monitors OPERABLE less than required by the MINIMUM CHANNELS OPERABLE requirement, comply with the ACTION requirements of Specification 3.4.6.1.

ACTION 15 - DELETED

ACTION 16 - With the number of OPERABLE channels less than required by the MINIMUM CHANNELS OPERABLE requirement, within 1 hour initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation.

ACTION 17 - With the number of OPERABLE channels less than required by the MINIMUM CHANNELS OPERABLE requirements, initiate the preplanned alternate method of monitoring the appropriate parameter(s), within 72 hours, and:

1) either restore the inoperable channel(s) to OPERABLE status within 7 days of the discovery or

2) prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 14 days following discovery outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

TABLE 4.3-3

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. AREA MONITORS				
a. Deleted				
b. Control Room Isolation	S	R	M	ALL MODES
c. Containment High Range	S	R*	M	1, 2, 3, & 4
d. Noble Gas Effluent Monitor (high range) (Unit 2 Stack)	S	R	M	1, 2, 3, & 4
2. PROCESS MONITORS				
a. Containment Atmosphere-Particulate	S	R	M	1, 2, 3, & 4
b. Containment Atmosphere-Gaseous	S	R	M	1, 2, 3, & 4

*Calibration of the sensor with a radioactive source need only be performed on the lowest range. Higher ranges may be calibrated electronically.

CONTAINMENT PURGE VALVE ISOLATION SIGNAL

LIMITING CONDITION FOR OPERATION

3.3.4 One Containment Purge Valve Isolation Signal containment gaseous radiation monitor channel, one Containment Purge Valve Isolation Signal containment particulate radiation monitor channel, and one Containment Purge Valve Isolation Signal automation logic train shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION: With no OPERABLE containment purge valve isolation signal, containment gaseous radiation monitoring channel, containment purge valve isolation signal, containment particulate radiation monitor channel, and containment purge valve isolation signal automatic logic train, enter the applicable conditions and required ACTIONS for the affected valves of Technical Specification 3.6.3.1, "Containment Isolation Valves."

SURVEILLANCE REQUIREMENTS

4.3.4.1 Perform a CHANNEL CHECK on each Containment Purge Valve Isolation Signal containment gaseous and particulate radiation monitor channel at least once per 12 hours.

4.3.4.2 Perform a CHANNEL FUNCTIONAL TEST on each Containment Purge Valve Isolation Signal containment gaseous and particulate radiation monitor channel at least once per 31 days.

This surveillance shall include verification of the trip value in accordance with the following:

The trip value shall be such that the containment purge effluent shall not result in calculated concentrations of radioactivity offsite in excess of 10 CFR Part 20, Appendix B, Table II. For the purposes of calculating this trip value, a $x/Q = 5.8 \times 10^{-6}$ sec/m^3 shall be used when the system is aligned to purge through the building vent and a $x/Q = 7.5 \times 10^{-8}$ sec/m^3 shall be used when the system is aligned to purge through the Unit 1 stack, the gaseous and particulate (Half Lives greater than 8 days) radioactivity shall be assumed to be Xe-133 and Cs-137, respectively. However, the setpoints shall be no greater than 5×10^5 cpm.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.6.1 Two independent Control Room Emergency Ventilation Trains shall be OPERABLE.*

APPLICABILITY: MODES 1, 2, 3, and 4.

During irradiated fuel movement within containment or the spent fuel pool.

ACTION:

MODES 1, 2, 3, and 4:

a. With one Control Room Emergency Ventilation Train inoperable, restore the inoperable train to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With both Control Room Emergency Ventilation Trains inoperable, except as specified in ACTION c., immediately suspend the movement of fuel assemblies within the spent fuel pool. Restore at least one inoperable train to OPERABLE status within 1 hour, or be in HOT STANDBY within the next 6 hours, and COLD SHUTDOWN within the following 30 hours.

c. With both Control Room Emergency Ventilation Trains inoperable due to an inoperable Control Room boundary, immediately suspend the movement of fuel assemblies within the spent fuel pool. Restore the Control Room boundary to OPERABLE status within 24 hours or be in HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

* The Control Room boundary may be opened intermittently under administrative control.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

ACTION (continued)

During irradiated fuel movement within containment or the spent fuel pool:**

d. With one Control Room Emergency Ventilation Train inoperable, restore the inoperable train to OPERABLE status within 7 days. After 7 days, either initiate and maintain operation of the remaining OPERABLE Control Room Emergency Ventilation Train in the recirculation mode of operation, or immediately suspend CORE ALTERATIONS and the movement of fuel assemblies.

e. With both Control Room Emergency Ventilation Trains inoperable, or with the OPERABLE Control Room Emergency Ventilation Train required to be in the recirculation mode by ACTION d. not capable of being powered by an OPERABLE normal and emergency power source, immediately suspend CORE ALTERATIONS and the movement of fuel assemblies.

** In MODES 5 and 6, when a Control Room Emergency Ventilation Train is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of 3.7.6.1 Limiting Condition for Operation, provided: (1) its corresponding normal <u>or</u> emergency power source is OPERABLE; and (2) all of its redundant system (s), subsystem (s), train (s), component (s) and device(s) are OPERABLE, or likewise satisfy the requirements of the specification. Unless both conditions (1) and (2) are satisfied within 2 hours, then ACTION 3.7.6.1.d or 3.7.6.1.e shall be invoked as applicable.

CONTAINMENT PENETRATIONS

LIMITING CONDITION FOR OPERATION

3.9.4 The containment penetrations shall be in the following status:

a. The equipment door closed or capable of being closed under administrative control,*

b. The personnel air lock shall be either:

1. closed by one personnel air lock door, or

2. capable of being closed by an OPERABLE personnel air lock door, under administrative control,* and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either:

1. Closed by a manual or automatic isolation valve, blind flange, or equivalent, or

2. Be capable of being closed under administrative control.*

APPLICABILITY: During movement of irradiated fuel assemblies within containment.

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving movement of irradiated fuel assemblies in the containment.

SURVEILLANCE REQUIREMENTS

4.9.4.1 Verify each required containment penetration is in the required status at least once per 7 days.

4.9.4.2 Deleted

---

* Administrative controls shall ensure that appropriate personnel are aware that the equipment door, personnel air lock door and/or other containment penetrations are open, and that a specific individual(s) is designated and available to close the equipment door, personnel air lock door and/or other containment penetrations within 30 minutes if a fuel handling accident occurs. Any obstructions (e.g. cables and hoses) that could prevent closure of the equipment door, a personnel air lock door and/or other containment penetration must be capable of being quickly removed.

SHUTDOWN COOLING AND COOLANT CIRCULATION - HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

3.9.8.1 One shutdown cooling train shall be OPERABLE and in operation.

NOTE

1. The required shutdown cooling train may not be in operation for up to 1 hour per 8 hour period provided no operations are permitted that would cause a reduction in Reactor Coolant System boron concentration.

2. The normal or emergency power source may be inoperable for the required shutdown cooling train.

3. The shutdown cooling pumps may be removed from operation during the time required for local leak rate testing of containment penetration number 10 or to permit maintenance on valves located in the common SDC suction line, provided:

   a. No operations are permitted that would cause reduction of the Reactor Coolant System boron concentration,

   b. CORE ALTERATIONS are suspended, and

   c. Containment penetrations are in the following status:

      1) The equipment door is closed and secured with at least four bolts; and

      2) At least one personnel air lock door is closed; and

      3) Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be closed with a manual or automatic isolation valve, blind flange, or equivalent.

APPLICABILITY: MODE 6 with the water level $\geq$ 23 feet above the top of the reactor vessel flange.

SHUTDOWN COOLING AND COOLANT CIRCULATION - HIGH WATER LEVEL

LIMITING CONDITION FOR OPERATION

ACTION:

With no shutdown cooling train OPERABLE or in operation, perform the following actions:

a. Immediately suspend all operations involving a reduction in Reactor Coolant System boron concentration and the loading of irradiated fuel assemblies in the core; and

b. Immediately initiate action to restore one shutdown cooling train to OPERABLE status and operation; and

c. Within 4 hours place the containment penetrations in the following status:

   1. Close the equipment door and secure with at least four bolts; and

   2. Close at least one personnel air lock door; and

   3. Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be closed with a manual or automatic isolation valve, blind flange, or equivalent.

SURVEILLANCE REQUIREMENTS

4.9.8.1 One shutdown cooling train shall be verified to be in operation and circulating reactor coolant at a flow rate greater than or equal to 1000 gpm at least once per 12 hours.

SHUTDOWN COOLING AND COOLANT CIRCULATION - LOW WATER LEVEL

LIMITING CONDITION FOR OPERATION

3.9.8.2 Two shutdown cooling trains shall be OPERABLE and one shutdown cooling train shall be in operation.

> NOTE
> The normal or emergency power source may be inoperable for each shutdown cooling train.

APPLICABILITY: MODE 6 with the water level < 23 feet above the top of the reactor vessel flange.

ACTION:

a. With one shutdown cooling train inoperable, immediately initiate action to restore the shutdown cooling train to OPERABLE status OR immediately initiate action to establish $\geq$ 23 feet of water above the top of the reactor vessel flange.

b. With no shutdown cooling train OPERABLE or in operation, perform the following actions:

   1. Immediately suspend all operations involving a reduction in Reactor Coolant System boron concentration; and

   2. Immediately initiate action to restore one shutdown cooling train to OPERABLE status and operation; and

   3. Within 4 hours place the containment penetrations in the following status:

      a) Close the equipment door and secure with at least four bolts; and

      b) Close at least one personnel air lock door; and

      c) Each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be closed with a manual or automatic isolation valve, blind flange, or equivalent.

SURVEILLANCE REQUIREMENTS

4.9.8.2.1 One shutdown cooling train shall be verified to be in operation and circulating reactor coolant at a flow rate greater than or equal to 1000 gpm at least once per 12 hours.

4.9.8.2.2 The required shutdown cooling pump, if not in operation, shall be determined OPERABLE once per 7 days by verifying correct breaker alignment and indicated power available.

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SECTION PAGE

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3/4.10 SPECIAL TEST EXCEPTIONS

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3/4.9.4 CONTAINMENT PENETRATIONS (Continued)

containment openings each person has responsibility for closing. As necessary, equipment will be pre-staged to support timely closure of a containment penetration.

Prior to opening a containment penetration, a review of containment penetrations currently open is performed to verify that sufficient personnel are designated such that all containment penetrations can be closed within 30 minutes. Designated personnel may have other duties, however, they must be available such that their assigned containment openings can be closed within 30 minutes. Additionally, each new work activity inside containment is reviewed to consider its effect on the closure of the equipment door, personnel air lock, and/or other open containment penetrations. The required number of designated personnel are continuously available to perform closure of their assigned containment openings whenever irradiated fuel is being moved within the containment.

Administrative controls are also in place to ensure that the containment atmosphere boundary is established if adverse weather conditions which could present a potential missile hazard threaten the plant. Weather conditions are monitored during irradiated fuel movement whenever a containment penetration, including the equipment door and personnel air lock, is open and a storm center is within the plant monitoring radius of 150 miles.

The administrative controls ensure that the containment atmosphere boundary can be quickly established (i.e. within 30 minutes) upon determining that adverse weather conditions exist which pose a significant threat to the Millstone Site. A significant threat exists when a hurricane warning or tornado warning is issued which applies to the Millstone Site, or if an average wind speed of 60 miles an hour or greater is recorded by plant meteorological equipment at the meteorological tower. If the meteorological equipment is inoperable, information from the National Weather Service can be used as a backup in determining plant wind speeds. Closure of containment penetrations, including the equipment door and personnel air lock door, begin immediately upon determination that a significant threat exists.

When severe weather conditions which could generate a missile are within the plant monitoring radius, containment and spent fuel pool penetrations are closed to establish the containment atmosphere boundary.

3/4.9.5 DELETED

3/4.9.13 DELETED

3/4.9.14 DELETED

3/4.9.15 DELETED

3/4.9.16 SHIELDED CASK

The limitations of this specification and 3/4.9.15 ensure that in the event of a shielded cask drop accident 1) the doses from ruptured fuel assemblies will be within the assumptions of the safety analyses, 2) K_{eff} will remain $\leq$ .95.

3/4.9.17 MOVEMENT OF FUEL IN SPENT FUEL POOL

The limitations of this specification ensure that in the event of a fuel handling accident involving a dropped, misplaced, or misloaded fuel assembly (or consolidated fuel storage box), the Keff of the spent fuel pool racks and fuel transfer carriage will remain less than or equal to 0.95.

3/4.9.18 SPENT FUEL POOL - REACTIVITY CONDITION

The limitations described by Figures 3.9-1a, 3.9-1b, and 3.9-3 ensure that the reactivity of fuel assemblies and consolidated fuel storage boxes, introduced into the Region C spent fuel racks, are conservatively within the assumptions of the safety analysis.

The limitations described by Figure 3.9-4 ensure that the reactivity of the fuel assemblies, introduced into the Region A spent fuel racks, are conservatively within the assumptions of the safety analysis.

3/4.3.3 MONITORING INSTRUMENTATION

3/4.3.3.1 RADIATION MONITORING INSTRUMENTATION

The OPERABILITY of the radiation monitoring channels ensures that 1) the radiation levels are continually measured in the areas served by the individual channels and 2) the alarm or automatic action is initiated when the radiation level trip setpoint is exceeded.

The containment airborne radiation monitors (gaseous and particulate) provide early indication of leakage from the Reactor Coolant System as specified in Technical Specification 3.4.6.1.

3/4.3.3.9 - DELETED

3/4.3.3.10 - DELETED

3/4.3.4 Containment Purge Valve Isolation Signal

A high airborne radioactivity level inside containment will be detected by the containment airborne radiation monitors (gaseous and particulate). The actuation logic for this function is one out of four. High radioactivity inside containment, detected by any one of the four radiation detectors (two gaseous and two particulate), will automatically isolate containment purge.

An OPERABLE system capable of generating a Containment Purge Valve Isolation Signal consists of at least one containment gaseous radiation monitor channel, at least one containment particulate radiation monitor channel, and the associated automatic actuation logic train. An actuation logic train consists of the detectors, sensor channels, and logic circuits up to and including the Engineered Safeguards Actuation System actuation module.

These radiation monitors provide an automatic closure signal to the containment purge valves upon detection of high airborne radioactivity levels inside containment. The maximum allowable trip value for these monitors corresponds to calculated concentrations at the site boundary which would not exceed the concentrations listed in 10 CFR Part 20, Appendix B, Table II. Exposure for a year to the concentrations in 10 CFR Part 20, Appendix B, Table II, corresponds to a total body dose to an individual of 500 mrem, which is well below the guidelines of 10 CFR Part 100 for an individual at any point on the exclusion area boundary for two hours.

Determination of the monitor's trip value in counts per minute, which is the actual instrument response, involves several factors including: 1) the atmospheric dispersion (x/Q), 2) isotopic composition of the sample, 3) sample flow rate, 4) sample collection efficiency, 5) counting efficiency, and 6) the background radiation level at the detector. The x/Q of 5.8×10^{-6} sec/m^3 is the highest annual average x/Q estimated for the site boundary (0.48 miles in the NE sector) for vent releases from the containment and 7.5×10^{-8} sec/m^3 is the highest annual average x/Q estimated for an off-site location (3 miles in the NNE sector) for releases from the Unit 1 stack. This calculation also assumes that the isotopic composition is xenon-133 for gaseous radioactivity and cesium-137 for particulate radioactivity (Half Lives greater than 8 days). The upper limit of 5×10^5 cpm is approximately 90 percent of full instrument scale.

3/4.7.4 SERVICE WATER SYSTEM (Continued)

The Technical Specification Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the accident analysis are met and that subsystem OPERABILITY is maintained. The purpose of the service water pumps differential pressure test, Surveillance Requirement 4.7.4.1.a.2, a substantial flow test, is to ensure that the pumps have not degraded to a point where the accident analysis would be adversely impacted. The surveillance requirement acceptance criteria for the service water pumps was developed assuming a 7% degraded pump from the actual pump curves. Flow and pressure measurement instrument inaccuracies for the service water pumps have been accounted for in the design basis hydraulic analysis. It is not necessary to account for flow and pressure measurement instrument inaccuracies in the acceptance criteria contained in the surveillance procedure.

3/4.7.5 FLOOD LEVEL

The service water pump motors are normally protected against water damage to an elevation of 22 feet. If the water level is exceeding plant grade level or if a severe storm is approaching the plant site, one service water pump motor will be protected against flooding to a minimum elevation of 28 feet to ensure that this pump will continue to be capable of removing decay heat from the reactor. In order to ensure operator accessibility to the intake structure action to provide pump motor protection will be initiated when the water level reaches plant grade level.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

The OPERABILITY of the Control Room Emergency Ventilation System ensures that 1) the ambient air temperature does not exceed the allowable temperature for continuous duty rating for the equipment and instrumentation cooled by this system and 2) the control room will remain habitable for operations personnel during and following all credible accident conditions.

The OPERABILITY of this system in conjunction with control room design provisions is based on limiting the radiation exposure to personnel occupying the control room. For all postulated design basis accidents except a Fuel Handling Accident, the radiation exposure to personnel occupying the control room shall be 5 rem or less whole body consistent with the requirements of General Design Criteria 19 of Appendix "A," 10 CFR 50. For a Fuel Handling Accident, the radiation exposure to personnel occupying the control room shall be 5 rem TEDE or less consistent with the requirements of 10 CFR 50.67.

The LCO is modified by a footnote allowing the control room boundary to be opened intermittently under administrative controls. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls consist of stationing a dedicated individual at the opening who is in constant communication with the control room. This individual will have a method to rapidly close the opening when a need for control room isolation is indicated.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM (Continued)

The control room radiological dose calculations use the conservative minimum acceptable flow of 2250 cfm based on the flowrate surveillance requirement of 2500 cfm ± 10%.

Currently there are some situations where the CREV System may not automatically start on an accident signal, without operator action. Under most situations, the emergency filtration fans will start and the CREV System will be in the accident lineup. However, a failure of a supply fan (F21A or B) or an exhaust fan (F31A or B), operator action will be required to return to a full train lineup. Also, if a single emergency bus does not power up for one train of the CREV System, the opposite train filter fan will automatically start, but the required supply and exhaust fans will not automatically start. Therefore, operator action is required to establish the whole train lineup. This action is specified in the Emergency Operating Procedures. The radiological dose calculations do not take credit for CREV System cleanup action until 10 minutes into the accident to allow for operator action.

When the CREV System is checked to shift to the recirculation mode of operation, this will be performed from the normal mode of operation, and from the smoke purge mode of operation.

With both control room emergency ventilation trains inoperable due to an inoperable control room boundary, the movement of irradiated fuel assemblies within the spent fuel pool must be immediately suspended. The control room boundary must be restored to OPERABLE status within 24 hours, or the unit must be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

If the control room boundary is inoperable in MODES 1, 2, 3, and 4, the control room emergency ventilation trains cannot perform their intended functions. Actions must be taken to restore an OPERABLE control room boundary within 24 hours. During the period that the control room boundary is inoperable, appropriate compensatory measures (consistent with the intent of GDC 19) should be utilized to protect control room operators from potential hazards such as radioactive contamination, toxic chemicals, smoke, temperature and relative humidity, and physical security. Preplanned measures should be available to address these concerns for intentional and unintentional entry into this condition. The 24 hour allowed outage time is reasonable based on the low probability of a DBA occurring during this time period, and the use of compensatory measures. The 24 hour allowed outage time is a typically reasonable time to diagnose, plan, and possibly repair, and test most problems with the control room boundary.

Surveillance Requirement 4.7.6.1.c.1 dictates the test frequency, methods and acceptance criteria for the Control Room Emergency Ventilation System trains (cleanup trains). These criteria all originate in the Regulatory Position sections of Regulatory Guide 1.52, Rev. 2, March 1978 as discussed below.

3/4.7.6 CONTROL ROOM EMERGENCY VENTILATION SYSTEM (Continued)

Section C.5.a requires a visual inspection of the cleanup system be made before the following tests, in accordance with the provisions of section 5 of ANSI N510-1975:

- in-place air flow distribution test
- DOP test
- activated carbon adsorber section leak test

Section C.5.c requires the in-place Dioctyl phthalate (DOP) test for HEPA filters to conform to section 10 of ANSI N510-1975. The HEPA filters should be tested in place (1) initially, (2) at least once per 18 months thereafter, and (3) following painting, fire, or chemical release in any ventilation zone communicating with the system. The testing is to confirm a penetration of less than 0.05%* at rated flow. A filtration system satisfying this criteria can be considered to warrant a 99% removal efficiency for particulates.

Section C.5.d requires the charcoal adsorber section to be leak tested with a gaseous halogenated hydrocarbon refrigerant, in accordance with section 12 of ANSI N510-1975 to ensure that bypass leakage through the adsorber section is less than 0.05%.** Adsorber leak testing should be conducted (1) initially, (2) at least once per 18 months thereafter, (3) following removal of an adsorber sample for laboratory testing if the integrity of the adsorber section is affected, and (4) following painting, fire, or chemical release in any ventilation zone communicating with the system.

The ACTION requirements to immediately suspend various activities (CORE ALTERATIONS, irradiated fuel movement, etc.) do not preclude completion of the movement of a component to a safe position.

Technical Specification 3.7.6.1 provides the OPERABILITY requirements for the Control Room Emergency Ventilation Trains. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable in MODES 1, 2, 3, or 4 the requirements of Technical Specification 3.0.5 apply in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable in MODES 5 or 6 the guidance provided by Note "**" of this specification applies in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train. If a Control Room Emergency Ventilation Train emergency power source or normal power source becomes inoperable while not in MODES 1, 2, 3, 4, 5, or 6 the requirements of Technical Specification 3.0.5 apply in determining the OPERABILITY of the affected Control Room Emergency Ventilation Train.

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* Means that the HEPA filter will allow passage of less than 0.05% of the test concentration injected at the filter inlet from a standard DOP concentration injection.

** Means that the charcoal adsorber sections will allow passage of less than 0.05% of the injected test concentration around the charcoal adsorber sections.

3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the accident analyses.

3/4.9.4 CONTAINMENT PENETRATIONS

The requirements on containment penetration closure and OPERABILITY ensure that a release of radioactive material within containment to the environment will be minimized. The OPERABILITY, closure restrictions, and administrative controls are sufficient to minimize the release of radioactive material from a fuel element rupture based upon the lack of containment pressurization potential during the movement of irradiated fuel assemblies within containment. The containment purge valves are containment penetrations and must satisfy all requirements specified for a containment penetration.

Containment penetrations, including the personnel airlock doors and equipment door, can be open during the movement of irradiated fuel provided that sufficient administrative controls are in place such that any of these containment penetrations can be closed within 30 minutes. Following a Fuel Handling Accident, each penetration, including the equipment door, is closed such that a containment atmosphere boundary can be established. However, if it is determined that closure of all containment penetrations would represent a significant radiological hazard to the personnel involved, the decision may be made to forgo the closure of the affected penetration(s). The containment atmosphere boundary is established when any penetration which provides direct access to the outside atmosphere is closed such that at least one barrier between the containment atmosphere and the outside atmosphere is established. Additional actions beyond establishing the containment atmosphere boundary, such as installing flange bolts for the equipment door or a containment penetration, are not necessary.

Administrative controls for opening a containment penetration require that one or more designated persons, as needed, be available for isolation of containment from the outside atmosphere. Procedural controls are also in place to ensure cables or hoses which pass through a containment opening can be quickly removed. The location of each cable and hose isolation device for those cables and hose which pass through a containment opening is recorded to ensure timely closure of the containment boundary. Additionally, a closure plan is developed for each containment opening which includes an estimated time to close the containment opening. A log of personnel designated for containment closure is maintained, including identification of which

3/4.9.6 DELETED

3/4.9.7 DELETED

3/4.9.8 SHUTDOWN COOLING AND COOLANT CIRCULATION

In MODE 6, the shutdown cooling (SDC) trains are the primary means of heat removal. One SDC train provides sufficient heat removal capability. However, to provide redundant paths for decay heat removal either two SDC trains are required to be OPERABLE and one SDC train must be in operation, or one SDC train is required to be OPERABLE and in operation with the refueling cavity water level ≥ 23 feet above the reactor vessel flange. This volume of water in the refueling cavity will provide a large heat sink in the event of a failure of the operating SDC train. Any exceptions to these requirements are contained in the LCO Notes.

An OPERABLE SDC train, for plant operation in MODE 6, includes a pump, heat exchanger, valves, piping, instruments, and controls to ensure an OPERABLE flow path and to determine RCS temperature. In addition, sufficient portions of the Reactor Building Closed Cooling Water (RBCCW) and Service Water (SW) Systems shall be OPERABLE as required to provide cooling to the SDC heat exchanger. The flow path starts at the RCS hot leg and is returned to the RCS cold legs. An OPERABLE SDC train consists of the following equipment:

1. An OPERABLE SDC pump (low pressure safety injection pump);

2. The associated SDC heat exchanger from the same facility as the SDC pump;

3. An RBCCW pump, powered from the same facility as the SDC pump, and RBCCW heat exchanger capable of cooling the associated SDC heat exchanger;

4. A SW pump, powered from the same facility as the SDC pump, capable of supplying cooling water to the associated RBCCW heat exchanger; and

5. All valves required to support SDC System operation are in the required position or are capable of being placed in the required position.

In MODE 6, two OPERABLE SDC trains require 2 SDC pumps, 2 SDC heat exchangers, 2 RBCCW pumps, 2 RBCCW heat exchangers, and 2 SW pumps. In addition, 2 RBCCW headers are required to provide cooling to the SDC heat exchangers, but only 1 SW header is required to support the SDC trains. The equipment specified is sufficient to address a single active failure of the SDC System and associated support systems.

Either SDC pump may be aligned to the refueling water storage tank (RWST) to support filling the refueling cavity or for performance of required testing. A SDC pump may also be used to transfer water from the refueling cavity to the RWST. In addition, either SDC pump may be aligned to draw a suction on the spent fuel pool (SFP) through 2-RW-11 and 2-SI-442 instead of the normal SDC suction flow path, provided the SFP transfer canal gate valve 2-RW-280 is open under administrative control (e.g., caution tagged). When using this alternate SDC flow path, it will be necessary to secure the SFP cooling pumps, and limit SDC flow as specified in the appropriate procedure, to prevent vortexing in the suction piping. The evaluation of this alternate SDC flow path assumed that this flow path will not be used during

3/4.9.8 SHUTDOWN COOLING AND COOLANT CIRCULATION (Continued)

a refueling outage until after the completion of the fuel shuffle such that approximately one third of the reactor core will contain new fuel. By waiting until the completion of the fuel shuffle, sufficient time (at least 14 days from reactor shutdown) will have elapsed to ensure the limited SDC flow rate specified for this alternate lineup will be adequate for decay heat removal from the reactor core and the spent fuel pool. In addition, CORE ALTERATIONS shall be suspended when using this alternate flow path, and this flow path should only be used for short time periods, approximately 12 hours. If the alternate flow path is expected to be used for greater than 24 hours, or the decay heat load will not be bounded as previously discussed, further evaluation is required to ensure that this alternate flow path is acceptable.

These alternate lineups do not affect the OPERABILITY of the SDC train. In addition, these alternate lineups will satisfy the requirement for a SDC train to be in operation if the minimum required SDC flow through the reactor core is maintained.

In MODE 6, with the refueling cavity filled to $\geq$ 23 feet above the reactor vessel flange, both SDC trains may not be in operation for up to 1 hour in each 8 hour period, provided no operations are permitted that would cause a reduction in RCS boron concentration. Boron concentration reduction is prohibited because uniform concentration distribution cannot be ensured without forced circulation. This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, and RCS to SDC isolation valve testing. During this 1 hour period, decay heat is removed by natural convection to the large mass of water in the refueling pool.

In MODE 6, with the refueling cavity filled to $\geq$ 23 feet above the reactor vessel flange, both SDC trains may also not be in operation for local leak rate testing of the SDC cooling suction line (containment penetration number 10) or to permit maintenance on valves located in the common SDC suction line. This will allow the performance of required maintenance and testing that otherwise may require a full core offload. In addition to the requirement prohibiting operations that would cause a reduction in RCS boron concentration, CORE ALTERATIONS are suspended and all containment penetrations providing direct access from the containment atmosphere to outside atmosphere must be closed. The containment purge valves are containment penetrations and must satisfy all requirements specified for a containment penetration. No time limit is specified to operate in this configuration. However, factors such as scope of the work, decay heat load/heatup rate, and RCS temperature should be considered to determine if it is feasible to perform the work. Prior to using this provision, a review and approval of the evolution by the SORC is required. This review will evaluate current plant conditions and the proposed work to determine if this provision should be used, and to establish the termination criteria and appropriate contingency plans. During this period, decay heat is removed by natural convection to the large mass of water in the refueling pool.

The requirement that at least one shutdown cooling loop be in operation at $\geq$ 1000 gpm ensures that (1) sufficient cooling capacity is available to remove decay heat and maintain the water in the reactor pressure vessel below 140°F as required during the REFUELING MODE, (2) sufficient coolant circulation is maintained through the reactor core to minimize the effects of a boron dilution incident and prevent boron stratification, and (3) is consistent with boron

Attachment 6

Millstone Power Station, Unit No. 2

License Basis Document Change Request 2-18-02
Selective Implementation of the Alternative Source Term -
Fuel Handling Accident Analyses
Proposed FSAR changes (Information Only)

INSERT 1 (FSAR page 1.2-11)

Handling of irradiated fuel or moving a cask over the spent fuel pool does not require fuel handling area integrity or ventilation but it may be desirable to use the main exhaust or EBF systems, if available, as the exhaust discharge paths. If boundary integrity is set then these discharge paths provide a monitored radiological release pathway. If boundary integrity is not assured then suitable radiological monitoring is recommended per the Millstone Effluent Control Program.

These ventilation systems (main exhaust and EBFS) are normally available to provide for a filtered and monitored release pathway for effluents from the fuel handling area. If ventilation is not available, releases from the fuel handling area are monitored per the Millstone Effluent Control Program to ensure appropriate radiological effluent controls are in place.

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INSERT 2 (FSAR page 9.9-19)

Ventilation of the fuel handling area during handling of irradiated fuel may be provided by main exhaust or the auxiliary exhaust system (AES), but neither system is required. While these systems are used and fuel handling area boundary integrity is set, then any radioactive effluent is discharged via a filtered and monitored pathway. The integrity of the fuel handling area boundary is not a requirement while main exhaust or AES ventilation is in use. In the event that neither ventilation system is available, then suitable radiological monitoring is recommended per the Millstone Effluent Control Program.

****

INSERT 3 (FSAR pages 9.9-20 and 9.9-21)

There is no requirement for operation of the fuel handling area ventilation system prior to movement of irradiated fuel or a cask in the spent fuel pool. Nor is there any requirement for operation of any ventilation system to mitigate a fuel handling accident, or a cask drop accident in the fuel handling area. Post-accident doses attributable to a fuel handling or cask drop accident are within the criteria identified by Regulatory Guide 1.183 and 10 CFR 50.67 and do not credit either the main exhaust or AES ventilation systems .

****

INSERT 4 (FSAR page 11.E-2)

During periods when the spent fuel pool exhaust or the containment atmosphere monitors are not available, air samples are taken with portable sampling equipment in these areas on a scheduled basis per the Millstone Effluent Control Program to determine the presence of any unusual concentrations of airborne activity.

****

INSERT 5 (FSAR page 14.7-3)

Forced ventilation is not required while handling irradiated fuel in containment or in the fuel building, nor is containment or fuel handling area boundary integrity required. This allows any penetration to the containment (including the equipment hatch and personnel access door) or fuel handling area boundaries (e.g. including roll-up doors) to be open during fuel movement. Suitable radiological monitoring is recommended per the Millstone Effluent Control Program when boundary integrity is not set to ensure releases to the environment are monitored.

There is no requirement for automatic isolation of containment purge to mitigate a release through the containment purge system during fuel movement.
****

INSERT 6 (FSAR pages 14.7-4 and 14.7-5)

For each accident, the results indicate that the radiological consequences are within the criteria identified by Regulatory Guide 1.183 and 10 CFR 50.67. The limiting criteria are 6.3 rem TEDE for EAB and LPZ and 5 rem TEDE for the control room.

14.7.4.2.1 Fuel Handling Accident in the Spent Fuel Pool

This accident has been re-analyzed using the methods and assumptions contained in Regulatory Guide 1.183. A complete list of assumptions is provided in Table 14.7.4-1. The results of this analysis are within the limits as defined by 10CFR 50.67 and within the criteria identified in Regulatory Guide 1.183. This analysis does not require automatic initiation, isolation or re-alignment of main exhaust or AES ventilation system from radiation monitor response, nor does it require fuel handling area integrity.

14.7.4.2.2 Fuel Handling Accident in Containment

This accident has been re-analyzed using the methods and assumptions contained in Regulatory Guide 1.183. A complete list of assumptions is provided in Table 14.7.4-2. The results of this analysis are within the limits as defined by 10CFR 50.67 and within the criteria identified in Regulatory Guide 1.183. This analysis does not require automatic isolation of purge from radiation monitor response, nor does it require containment integrity because it is assumed that containment penetrations such as the equipment hatch are open.

14.7.4.3 Results of Analysis

14.7.4.3.1 Fuel Handling Accident in the Spent Fuel Pool

	TEDE, rem
EAB	1.2E+00
LPZ	1.5E-01
Control Room	4.6E+00

14.7.4.3.2 Fuel Handling Accident in Containment

	TEDE, rem
EAB	1.2E+00
LPZ	1.5E-01
Control Room	4.6E+00

14.7.4.4 Conclusions

Doses at the exclusion area boundary (EAB), low population zone (LPZ) and the control room are within the requirements of 10 CFR 50.67 and within the guidelines identified in Regulatory Guide 1.183. Therefore, a fuel handling accident in the containment or spent fuel buildings will not present any undue hazard to the health and safety of the public, nor will it compromise control room operations.
****

INSERT 7 (FSAR page 14.7-5)

	TEDE, rem
EAB	1.1E-01
LPZ	1.4E-02
Control Room	5.0E-02

Doses at the exclusion area boundary (EAB), low population zone (LPZ) and the control room are within the requirements of 10 CFR 50.67 and within the guidelines identified in Regulatory Guide 1.183. Therefore, a cask drop accident will not present any undue hazard to the health and safety of the public, nor will it compromise control room operations.

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CHAPTER 14

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CHAPTER 14

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to the sodium hypochlorite system. Three vertical, centrifugal, half-capacity service water pumps have a design flow of 12,000 gpm, each with a total dynamic head of 100 feet of water. These pumps take suction from and discharge to Long Island Sound.

The service water system consists of two redundant, independent cross-connected supply headers with isolation valves to all heat exchangers and two discharge headers for the RBCCW heat exchangers. One discharge header exists for the emergency diesel generator cooling water, TBCCW, chilled water system and vital switchgear room cooling heat exchangers. Each of the supply headers is supplied by one of the service water pumps. During normal operation and shutdown and following a postulated LOCA, the two pumps connected to the two redundant supply headers are in service. However, only one service water pump and header is required to provide cooling of the RBCCW and diesel following a LOCA or for unit shutdown. Remote manually operated valves allow the third service water pump to be connected to either of the redundant headers.

The intake structure consists of four independent bays. The intake structure is equipped with a chlorination system, consisting of two 1800 gallon sodium hypochlorite storage tanks and two jet pumps. Service water is used to operate two jet pumps with one supplying sodium hypochlorite to the service water intake and the other to the circulating water intake. The system is designed to maintain a chlorine concentration of 0.2 ppm in the water ahead of the screens. The purpose of the system is to control slime and algae growth within the intake structure and in the cooling water piping between the intake structure and the condenser.

1.2.10.7 Ventilation Systems

Normally the containment environment is cooled by the containment air recirculation and cooling system. Following a postulated LOCA, these units reduce the temperature and pressure of the containment atmosphere to a safe level (see subsections 1.2.7., 6.5 and 9.9.1). The containment auxiliary circulation fans maintain uniform containment environmental temperature by mixing the air. Normally, the environment for the control element drive mechanisms is maintain by the CEDM fan-coil units. A forced outside air purge system is provided to maintain a suitable environment within the containment whenever access is desired. The exhaust of this containment air purge system is monitored to assure that radioactive effluents are maintained within acceptable limits.

The auxiliary building is served by separate ventilation systems in the fuel handling area, the radioactive waste area and for the nonradioactive waste area. Each area is provided with a heating and ventilating supply unit and separate exhaust fans. Exhausts from the potentially contaminated areas are filtered through high-efficiency particulate air (HEPA) filters, monitored, and discharged through the Unit 2 stack. Exhaust from clean areas is discharged directly to the atmosphere (see Subsection 9.9.6).

INSERT 1

Prior to the handling of irradiated fuel, the exhaust from the fuel handling area is diverted from the main exhaust system to the auxiliary exhaust system which discharges to the EBFS. Therefore, in the event of a fuel handling accident resulting in release of radioactive fission products, the exhaust is diverted through the enclosure building filtration system prior to release through the Millstone stack. 00-63

Two full-capacity and redundant air conditioning systems are provided for the control room. In the event of an accident, a bypass through either of the two full-capacity and

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redundant control room filtration systems, which contain charcoal filters, is provided to protect control room operating personnel from exposure to high radiation levels.

The turbine building is equipped with supply and exhaust fans for year- round ventilation.

The access control area is air conditioned for year-round comfort. All other areas are provided with ventilation for cooling during summer and unit heaters for heating during the winter.

1.2.10.8 Fire Protection System

The fire protection systems' (see Section 9.10) function to protect personnel, structures, and equipment from fire and smoke. The fire protection systems have been designed in accordance with the applicable National Fire Protection Association (NFPA) Codes and Standards, regulatory requirements, industry standards, and approved procedures. The design of the various fire protection systems has been reviewed by American Nuclear Insurers (ANI).

The fire detection and protection systems are designed such that a fire will be detected, contained, and/or extinguished. This is accomplished through the use of noncombustible construction, equipment separation, fire walls, stops and seals, fire detection systems, and automatic and manual water suppression systems. As a minimum, portable extinguishers, hose stations, and fire hydrants are available for all areas to control or extinguish a fire.

1.2.10.9 Compressed Air Systems

The instrument air system consists of one 642 scfm and two 323 scfm (each) instrument air compressors, receivers, dryers, and after-filters to provide a reliable supply of clean, oil-free dry air for the unit pneumatic instrumentation and valves. Station air for normal unit maintenance is provided by a separate 630 scfm station air compressor. Operating pressures for both systems range between 80 to 120 psig depending on how the compressors are aligned and how the systems are interconnected.

The station air is used as a backup to the instrument air with tie-in points at the receiver inlets and inside the containment. The compressed air systems for Units 1 and 2 are interconnected by piping and manually operated valves.

Descriptions of the compressed air systems are given in Section 9.11.

1.2.11 Steam and Power Conversion System

The turbine generator for Unit 2 is furnished by General Electric Company. It is an 1800 rpm tandem compound, four flow exhaust, indoor unit designed for saturated steam conditions.

Under nominal steam conditions of 850 psia and 525°F at the turbine stop valve inlets and with turbines exhausting against a condenser pressure of 2 inches Hg absolute, the gross electrical output is 895 MWe. Turbine output corresponds to a NSSS thermal power level of approximately 2715 MWt.

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6.7 ENCLOSURE BUILDING FILTRATION SYSTEM

6.7.1 Design Bases

6.7.1.1 Functional Requirements

The functions of the enclosure building filtration system (EBFS) are to collect and process potential containment leakage, to minimize environmental activity levels resulting from sources of containment leakage following a loss of coolant accident (LOCA), ~~and in case of a fuel accident in the spent fuel pool area which results in a release of radioactivity (Section 9.9.8.3.2)~~. The enclosure building filtration region (EBFR) contains potential containment leakage. Throughline leakage that can bypass the EBFR is discussed in Section 5.3.4. The EBFS is also designed to reduce the concentration of combustible gas built up in the containment following a LOCA in conjunction with the Hydrogen Purge System (Section 6.6). Although not credited in the fuel handling accident and cask drop analyses, EBFS is capable of being automatically or manually aligned to minimize the consequences of these accidents.

6.7.1.2 Design Criteria

The following criteria have been used in the design of the EBFS:

a. The system has two redundant, independent subsystems, each fully capable of the functional requirement.

b. The system has suitable subsystem and component alignments to assure operation of the complete subsystem and with its associated components.

c. Capabilities are provided to assure the system operation with either on-site power (assuming off-site power is not available) or with off-site electrical power.

d. A single failure of an active component in either subsystem will not affect the functional capability of the other subsystem.

e. The EBFS is designed to permit periodic inspection of important components such as fans, motors, filters, filter frames, ductwork, dampers, piping and valves to assure the integrity and capability of the system.

f. The EBFS is designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole. Under conditions as close to the design as practical, the performance is demonstrated of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system and the transfer between normal and emergency power sources.

g. The EBFS is designed to the general requirements as described in Section 6.1.

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h. The components of the EBFS are designed to operate in the most severe post-accident environment as described in Section 6.1, with the exception of the electric heaters, X-6/A/B.

i. The EBFS is designed to support the Hydrogen Purge System (Section 6.6) in accordance with the conditions given in Safety Guide 7. However, consistent with Regulatory Guide 1.7, Rev. 2, a backup hydrogen purge system is not required to satisfy the safety-related function to control post-accident containment hydrogen. Therefore, the backup hydrogen purge system is no longer credited for hydrogen control.

6.7.2 System Description

6.7.2.1 System

The EBFS is shown schematically in Figures 9.9-1 and 9.9-2. The EBFR includes the region between the containment and the enclosure building, the penetrations rooms and the engineered safety feature equipment rooms.

The EBFS is designed to establish and maintain a negative pressure of 0.25 inches w.g. within the EBFR immediately following a LOCA and to reduce airborne radioactive products to the environment by filtration prior to release of air through the Millstone Stack. Neglecting wind and stack effects, each EBFS train has the capability to maintain the EBFR under the minimum negative pressure of 0.25 inches w.g. The required minimum negative pressure can be achieved using both trains or either train of the redundant filtration systems. 00-63

The EBFS is located external to the containment in an enclosed area adjacent to the enclosure building. The EBFS exhausts air from all areas of the EBFR. Makeup air is induced into the EBFR by infiltration through building cracks, doors, and penetrations between the EBFR and outside or surrounding structures, as well as from potential containment leakage. The entire system is designed to operate under negative pressure up to the fan discharge. In all cases, the flow rate from this region exceeds the total maximum containment leakage rate.

The inleakage into the EBFR was originally estimated using analytical and experimental leakage data (Reference 6.7-1). This leakage rate included a conservative containment leakage rate of 0.03 containment volumes per day. The design inleakage rate was established at a factor of 3.0 greater than the estimated inleakage rate. The leak tightness of the containment is independent of the operation of the EBFS and is established through Integrated Leak Rate Testing (ILRT) (Section 5.2.9.1).

The original Bechtel building specification for the enclosure building (Reference 6.7-2), required that all metal siding and metal roof decking be designed to withstand the pressure created by a wind load of 140 mph (Subsection 5.3) at the girt spacing shown on the design drawings, and with a maximum deflection of L/180 of span under load. In addition to the wind pressure, the metal siding and roof decking shall also withstand a differential pressure equivalent to 2 inches water gauge and maintain air tightness for the completed installation. On May 25, 1972, a Test (Reference 6.7-3) was performed based on the Specification (Reference 6.7-2) for a "negative pressure of 2 inches of water plus a wind

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pressure of 140 miles per hour." The total test pressure of 9.75 inches w.g. was used and the leak tightness capability was established at this pressure. The calculated maximum negative pressure (Reference 6.7-1) demonstrates that during two parallel fans operation, the EBFR negative pressure is less than the tested limit of 9.75 inches w.g.

The EBFS consists of independent, full redundant fans, filter banks, heating elements, isolation dampers, and ductwork with the exception of common plenums. Charcoal filters installed are demonstrated by tests to have a bypass leakage efficiency above 99 percent, and by a laboratory test to have an iodine removal efficiency above or equal to 95 percent in accordance with Technical Specification requirements.

The prefilters are provided to remove coarse airborne particles to prolong high efficiency particulate air (HEPA) filter life. The HEPA filters are provided to remove fine airborne particles that penetrate the prefilters. The activated coconut shell charcoal filters are impregnated to remove methyl iodine as well as elemental iodine contaminates resulting from a LOCA or a spent fuel handling accident in the spent fuel pool.

Electric heaters (X-61A/B), rated at 25 kW each, are provided to maintain the entering air stream relative humidity (RH) to the charcoal filters below 90 percent. They are also required to be operated per technical specification surveillance requirements. These heaters may not be available throughout a LOCA due to high radiation. However, analyses considering the maximum possible relative humidity within the Enclosure Building Filtration Region, during a LOCA, or a REA, or within the Fuel Handling area during a Fuel Handling Accident, determined that the entering EBFS air stream remains below 90 percent RH without the heaters. The electric heaters are energized when the fan is on and deactivated manually prior to initiation of Hydrogen purge.

The EBFS fans are belt driven centrifugal fans capable of operating singly or in parallel with the redundant system. EBFS fan operating parameters are shown in Table 6.7-1. A failure mode analysis for the EBFS is given in Table 6.7-2.

Ductwork for that portion of the EBFS located outside the enclosure building is round and/or rectangular. Longitudinal seams are continuously welded air tight.

The EBFS may be used for containment cleanup during cold shutdown and refueling (Modes 5 and 6). The EBFS can be operated in combination with the containment purge system (Section 9.9.2) for containment cleanup of minor releases of radioactivity. These interconnections between the two systems are shown in Figures 9.9-1 and 9.9-2. This process may be initiated to reduce activity levels prior to purging the containment.

When using the EBFS to purge containment, either train or both trains may be used to perform this activity. The incoming flow path is provided by opening the following dampers: 2-AC-1, 3, 4, & 5 and the exhaust flow path is provided by opening 2-AC-6 and 2-AC-7. Since the purge supply fan, F-23, is not activated, the purge rate is a function of the EBFS train(s) capacity.

The EBFS may also be used to vent (depressurize) the containment under all modes of operation, through the hydrogen purge system, by opening the six-inch line valves 2-EB-99/100, or 2-EB-91/92.

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The EBFS discharges to the Millstone stack. Containment cleanup is initiated manually by operator action. The connections to the EBFS are automatically closed by an EBFAS to assure system integrity for post-accident operations. 00-63

6.7.2.2 Components

The major components with their associated fabrication and performance data are listed in Table 6.7-1.

6.7.3 System Operation

6.7.3.1 Emergency Conditions

In the unlikely event of a LOCA, the EBFS is automatically initiated by the EBFAS as described in Section 7.3. Air is exhausted from the EBFR, processed through the filter banks and discharged through underground piping to the Millstone 375-foot stack. 00-63 Redundant onsite emergency power is provided by the diesel generators as described in Section 8.3.

System performance is monitored in the control room. Differential pressure across the filter units indicates filter dust loading and replacement requirements. Low flow conditions are alarmed in the control room and local flow indication is provided upstream of each filter unit. A temperature sensor is located within each enclosure filter unit in the vicinity of the charcoal elements to alarm excessive temperature.

The pneumatically operated dampers are normally closed to isolate the filter unit. These dampers open automatically upon the EBFAS and are designed to fail in the open position. The positions of all power operated dampers are indicated in the control room.

The EBFS also serves as the standby emergency ventilation system for the fuel handling area. This operation is described in Section 9.9.8.

The EBFS is designed to reduce the concentration of combustible gas buildup in the containment following a LOCA by controlled purging operations. This operation is described in Subsection 6.6.3.

Prior to initiation of the hydrogen purge system, the electric heaters in the EBFS filter units are manually taken out of service by tripping electric heater supply breaker. The backup purge operation is described in Section 6.6.2.1.

6.7.4 Availability and Reliability

6.7.4.1 Special Features

The enclosure building structure is designed to retain structural integrity subsequent to a seismic event. However, the EBFS is not designed to be functional subsequent to a safe shutdown earthquake (SSE). All components are protected from missile damage and pipe whip by physically separating duplicate equipment as described in Section 6.1.

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The reliability of the EBFS is assured by providing two independent, with the exception of common ductwork plenums, full-capacity subsystems. Each subsystem is capable of maintaining the design negative pressure within the EBFR and of discharging into the 375-foot stack . 00-63

Differential pressure is measured from various locations within the EBFR including four locations within the enclosure building proper. The acceptance criteria is that each EBFS train individually establish a minimum negative pressure of greater than or equal to 0.25 inches w.g. in the EBFR within one minute after an enclosure building filtration actuation signal (EBFAS). Neglecting wind and stack effects, each EBFS train has the capability to maintain the EBFR under the minimum negative pressure of 0.25 inches w.g. The acceptance criteria of 0.25 inches w.g. assures that the EBFR will be maintained at a negative or neutral pressure precluding exfiltration under most meteorological conditions. With one EBFS train exhausting the EBFR, the combined effects of certain wind and stack pressures may cause positive pressures in the upper regions of the enclosure building. The potential exfiltration and radiological consequences due to positive pressure in the upper regions of the enclosure building, were analyzed and determined to be fully bounded by the radiological consequences of the low wind speed LOCA case presented in Section 14.8.4.

The EBFR is constructed to limit leakage as described in Section 5.3. Piping, cable tray and ductwork penetrations through the EBFR boundary are sealed with foam or insulation to decrease leakage. All doors into the EBFR are designed to minimize leakage. Containment penetrations into the EBFR are described in Section 5.2.7 and Section 5.3. The metal siding is constructed to limit leakage as described in Subsection 6.7.2.1.

The EBFS fans F25A/B are fully redundant and are powered from separate emergency sources. The EBFS fans are connected on the suction side by cross-tie ductwork which is provided with a parallel arrangement of electric motor-operated dampers which are likewise powered from separate emergency sources. These dampers are normally closed but can be opened by operator action following a fan failure. The design of the EBFS is such that it renders a loss of cooling air to the filters due to fan failure as incredible. The EBFS requires no additional decay heat removal system. Cooling air is always available, but not necessary (Section 6.7.4.1.1), to prevent iodine desorption and, therefore, ignition of the charcoal elements.

Each subsystem has a nominal design flow of 9,000 CFM. The fan performance curve is shown in Figure 6.7-3.

A failure mode analysis for the EBFS is given in Table 6.7-2. Although there are common plenums, all ductwork is considered a passive component whose failure is not credible.

6.7.4.1.1 Minimum Air Flow Required to Prevent Desorption of Radionuclides

The charcoal filter elements within the EBFS are analyzed to ensure adequate iodine removal capacity, and residual heat removal capabilities following any single failure. The analysis assumed iodine loading is limited to one EBFS unit, and concluded:

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- Iodine loading of the enclosure building charcoal filters at 30 days post-accident is 0.267 milligrams of iodine per gram of charcoal, or approximately 11% of Regulatory Guide 1.52 design loading.

- No minimum flow is necessary to maintain the charcoal temperature below 200°F.

However, a temperature sensor is mounted within each filter unit, in the vicinity of the charcoal beds. This sensor provides alarm capability in the control room at 200°F or less.

6.7.4.1.2 Single Failure Evaluation

The containment and enclosure building purge system functions to maintain a suitable environment in the containment building (during Modes 5 and 6) or the enclosure building during any mode of operation (see Section 9.9.2).

As noted in Table 9.9-2 of the FSAR, the containment and enclosure building purge system is a nonsafety-related system. Purge system isolation dampers 2-AC-1 and 2-AC-11, including control circuits, are safety related since they receive a containment isolation actuation signal (CIAS) to close to isolate the enclosure building in the event of a LOCA. For the same reason, the controls for purge fan F23 are also safety related.

Simultaneous occurrence of a LOCA and a seismic event is not a design basis for Millstone Unit 2. Although the enclosure building structure is designed to retain structural integrity subsequent to a seismic event, the EBFS is not designed to be functional subsequent to an SSE. Maintaining a negative pressure in the enclosure building after an SSE is not assured mainly because the sheet metal siding may not remain intact. The original design for the purge supply and exhaust ductwork is nonsafety related and nonseismic.

FSAR Question 6.15.4 addressed single failure (failure to close on CIAS) for dampers 2-AC-1 (purge supply) and 2-AC-11 (purge exhaust). The response to Question 6.15.4 documented the basis for concluding that with an assumed single failure of 2-AC-1 to close, the minimum negative pressure of 0.25 in. w.g. can be maintained within the EBFR. The response noted that the evaluation was conservative for a postulated single failure of the exhaust damper 2-AC-11.

Since the installation of damper 2-AC-130 eliminates the 2-AC-1 damper single failure, there is assurance that the EBFS can maintain an adequate negative pressure within the EBFR as described in Subsection 6.7.2.

The containment and enclosure building purge inlet was modified with the installation of a counterbalanced gravity damper (2-AC-130) to provide redundancy for isolation damper 2-AC-1. This design change was a system upgrade to mitigate a postulated single failure of the Facility 1 CIAS signal to 2-AC-1.

The Main Exhaust System (MES) fans will trip on a CIAS actuation signal as described in Section 9.9.9.4.1, to mitigate the consequences of the 2-AC-11 single failure vulnerability. If the postulated single failure of 2-AC-11 occurred the MES fans will automatically trip. The enclosure building integrity is maintained by the design of the enclosure building as described in Section 6.7.2.1.

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FSAR Question 6.17 addressed single failure (failure to open on CIAS) of enclosure building purge isolation dampers 2-AC-3 and 2-AC-8. The response stated that the assumed single failure of either damper was acceptable.

A design basis review of enclosure building isolation dampers 2-AC-1 and 2-AC-11 is documented in Millstone Unit 2 Nuclear Engineering Design and Program Services Department records.

6.7.4.2 Tests and Inspections

Individual components of the EBFS are tested to assure performance.

Prefilters are of the throwaway type to be replaced as necessary.

The HEPA filters characteristics are in accordance with MIL-STD-282 standard.

Each HEPA filter bank is tested, in place, periodically. The testing media will be Dioctyl-phthalate (DOP).

Charcoal filters are initially shop performance tested and methyl iodide tracers for efficiency and Freon for leakage. After installation the charcoal filter banks were tested in place with Freon to ensure that there is no leakage across the filter bank and that the charcoal elements are not damaged. Each charcoal filter housing is provided with test canisters which contain a sample specimen of the charcoal used in the filter elements. These test canisters are analyzed periodically by an independent laboratory to determine remaining charcoal filter life and replacement requirements.

Each fan and motor is tested as a unit to assure characteristic performance curves. Fan ratings are in accordance with AMCA Standard Test Code 211-A.

The EBFS ductwork is leak tested and balanced in accordance with SMACNA Standards.

Provisions are incorporated to test the entire system for performance during normal operation. Each EBFS fan is tested simultaneously with the associated power operated valves and instrumentation, but independently from the redundant subsystem.

The EBFAS is initiated to start the fan and open the filter unit isolation dampers. The fan is tested at some point on the fan performance curve other than shutoff. Fan flow is verified by measuring the pressure differential across the filter elements. Opening of the power-operated dampers is monitored by the damper position indication in the control room. Since the containment purge ducts are vented back into the enclosure building by fail open dampers, additional testing is not necessary.

The EBFS is tested periodically to assure the negative pressure is maintained within the EBFR. EBFR negative pressure is monitored by differential pressure indicators located throughout the EBFR.

The EBFS undergoes a preoperational test prior to startup. The test procedure is described in Section 13.

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The system equipment is fully accessible during all normal operation for maintenance and performance testing, including replacement of filter elements. The equipment is accessible for inspection and maintenance on components outside of the air stream during accident conditions.

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REFERENCES

6.7-1 "Conventional Buildings for Reactor Containment," NAA-SR-10100, dated May 1965, issued by Atomics International, a Division of North American Aviation Incorporated.

6.7-2 Bechtel Specification No. 7604-A-16A, Section 12.0, "Design Criteria."

6.7-3 Pittsburgh Testing Laboratory witnessed an "Air Infiltration Test," on Siding and Roof Deck Mock-up, of the enclosure building, for Elwin G. Smith Division, Cyclops Corporation.

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7.3.1.2.7 Testability

The ESAS system is designed to permit testing up to and including the actuation module during power operation.

The ESAS system has an automatic testing system. This system is described in Section 7.3.4.

7.3.1.2.8 Response Time

The overall response time of the ESAS system shall be measured from the sensor input to the trip device output terminals and will not exceed 500 milliseconds.

7.3.2 System Description

7.3.2.1 General

The ESFAS detects accident conditions and initiates the safety features systems which are designed to localize, control, mitigate, and terminate such incidents. The ESAS was designed and constructed by Consolidated Controls Corp. in Bethel, Connecticut. The AFAIS equipment was supplied by the Foxboro Company. The engineered safety features actuation system is divided into four sensor channels (A, B, C, D), two actuation channels and actuation logic channels.

Each of the two ESAS actuation and logic channels includes an automatic load sequencer for sequentially loading the emergency diesel generators (DG) following a loss of normal power. A separate third channel is incorporated into the ESAS to actuate equipment that can be energized by either of the two electrical divisions.

All process variables are transmitted as analog signals. Loss of voltage on the 4.16-kV emergency bus is detected through the potential transformers by the ESFAS undervoltage modules.

Four essential or vital power sources are provided for the ESFAS. Two emergency DGs are provided to supply power to the actuated equipment of the protective systems in case of loss of offsite power.

If offsite power is available, the engineered safety features (ESF) equipment starts directly. If offsite power is not available, load shedding and sequencing are required for sequential loading of the DGs.

As a result of IE Bulletin No. 80-06, "Engineered Safety Feature Reset Controls," the ESF Reset Controls have been modified so that ESF actuated equipment remains in its emergency, "actuated," mode following reset of an ESFAS until deliberate operator action is taken.

7.3.2.2 Sensor Channels

The instrument channels monitor redundant and independent process variables and initiate a sensor channel trip when the variable or condition deviates beyond a set limit. Each of the actuation channels receives a signal from the following variables: (See Figures 7.3-1, 2, 3, 4.)

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a. Pressurizer Pressure

Low pressurizer pressure during power operation is indicative of a loss of coolant accident (LOCA). It is measured with four redundant pressure transmitters. A pressure loss below 1714 psia on any two of four bistables in the ESF system will initiate a simultaneous safety injection actuation signal (SIAS), containment isolation activation signal (CIAS), and enclosure building filtration actuation signal (EBFAS). These signals will isolate all unnecessary lines at the containment penetration, initiate safety injection system (SIS) operation, and start the enclosure building filtration system (EBFS). The four pressure transmitters are also used for input signals to the RPS.

b. Containment Pressure

High containment pressure during power operation is indicative of a LOCA or main steam line break. It is measured with four pressure transmitters. An increase in containment pressure to 4.42 psig on any two of four bistables in the ESF system will initiate a simultaneous SIAS, CIAS, EBFAS, and MSIAS. Measurement of containment high pressure is a diverse means of sensing a loss of coolant condition. The transmitters are reverse acting type (increasing input gives a decreasing output signal) to permit fail safe operation.

With regard to power requirements, loss of instrument power results in a tripped bistable which would require only one more of the three remaining bistables to trip in order to get an actuation.

A failure mode analysis for loss of onsite instrument power is shown in Table 7.3.2.2-1.

A further increase in containment pressure to 9.48 psig will initiate a containment spray actuation signal (CSAS) which will start two containment spray pumps and open their respective discharge motor operated valves (MOV) to start spraying.

c. Containment Gaseous and Particulate Radiation

If these monitors were to fail or were unavailable, grab samples are taken or portable continuous air monitoring equipment is used.

Two gaseous and two particulate monitors are used to detect the release of radioactive fission products to the containment atmosphere. The ESFAS logic will initiate containment purge isolation should any one of the four monitors exceed its set point. Automatic purge isolation is not credited in the fuel handling accident analysis.

d. Steam Generator Pressure

Each steam generator pressure is sensed by four pressure transmitters. A drop in pressure to 572 psia on any two out of the four sensor channels on either steam generator will actuate a main steam isolation actuation signal (MSIAS) which automatically closes both MSIVs. The four pressure transmitters are also used for input signals to the RPS.

e. Fuel Handling Area Radiation

Fuel handling area high radiation is sensed by four redundant area radiation monitors located on walls adjacent to the spent fuel pool. Upon detection of high radiation due to a fuel handling accident from any two of the four monitors, an auxiliary exhaust actuation signal (AEAS) is generated which stops the spent fuel pool area outside air supply fan and diverts the exhaust to the EBFS. However, the fuel handling area radiation system automatic functions are not credited in the fuel handling accident analyses.

f. Refueling Water Storage Tank Level

The safety injection pumps initially take suction from the refueling water storage tank (RWST). After the tank level has decreased to 46 inches as measured by two of four level sensing channels, a sump recirculation actuation signal (SRAS) transfers the safety injection pump suction to the containment sump for long term recirculation.

g. Emergency Bus Undervoltage

The undervoltage protection provided for the emergency buses consists of two independent schemes, one for each 4160 Volt emergency bus, 24C(A3) and 24D(A4). Each scheme employs redundant design features and consists of two levels of protection. The Level 1 undervoltage protection (loss-of-voltage) is designed to detect a loss of voltage on the emergency buses. The Level 1 undervoltage logic isolates the emergency buss from all sources, initiates automatic loading shedding, and provides a start signal for the diesel generator associated with the emergency bus. The Level 2 undervoltage protection (degraded voltage) is designed to protect the safety-related equipment from operation under sustained low (degraded) voltage conditions. The Level 2 undervoltage logic provides a trip signal to the reserve station service transformer (RSST) supply breaker of the associated bus. Figure 7.3-1 illustrates the emergency bus undervoltage protection logic (see also FSAR Section 8.2).

Potential transformers on 4160 Volt emergency buses 24C(A3) and 24D(A4) provide voltage inputs to the ESAS undervoltage sensor logic. In the ESAS sensor cabinets, these analog inputs are compared to the trip setpoints for the Level 1 and Level 2 undervoltage protection. The Level 1 and Level 2 trip outputs associated with bus 24C(A3) are connected to the ESAS Facility 1 actuation logic cabinet. The Level 1 and Level 2 trip outputs associated with bus 24D(A4) are connected to the ESAS Facility 2 actuation logic cabinet.

The trip setpoints and associated time delays for the Level 1 and Level 2 undervoltage protection are defined in the Technical Specifications and are as follows:

Level 1	2912 Volts with a time delay of 2 seconds
Level 2	3700 Volts with a time delay of 8 seconds

The time delay for the Level 1 undervoltage setpoint was chosen to:

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9.9.2 Containment and Enclosure Building Purge System

9.9.2.1 Design Bases

9.9.2.1.1 Functional Requirements

The purge system functions to maintain a suitable environment for personnel access into the containment or enclosure building. The purge system provides fresh air ventilation or heating whenever required.

9.9.2.1.2 Design Criteria

The following criteria have been used in the design of the purge system:

a. The containment and enclosure building purge system shall be designed to permit periodic inspection of important components such as fan, motor, belt, coil, ductwork, piping and valves to assure the integrity and capability of the system.

b. The purge containment isolation valves shall be designed with leak detection capabilities.

c. The components of the system shall be designed to operate in the environment to which exposed.

9.9.2.2 System Description

9.9.2.2.1 System

The purge system is shown schematically in Figure 9.9-1.

The purge system can be lined up to either containment or the enclosure building.

The purge system is designed to provide adequate fresh air for the containment or the enclosure building by using supply fan F-23. However, the purge rate is balanced to maintain a negative pressure in the area being purged. Its associated steam heating coil, X-43, is sized to temper 0°F outside air to 70°F for personnel comfort, maintaining a desired environment atmosphere temperature of approximately 60°F, which is consistent throughout the plant for unmanned areas.

The purge system consists of an air handling unit, located in the auxiliary building, which supplies filtered and tempered air to either the containment or the enclosure building. All the purge system, except interior ducts and two isolation valves, will be located outside the containment. Branch ducts and isolation dampers are provided for ventilating the enclosure building. Auxiliary steam is provided as the heating medium when required.

9.9.2.2.2 Components

The major system components and associated fabrication and performance data are listed in Table 9.9-2. Fan performance curve is shown in Figure 9.9-6.

9.9.2.3 System Operation

The purge system is not operating and the containment isolation valves are locked closed in Modes 1 through 4 by shutting them, pulling their control power fuse and locking their associated fuse block. By locking them closed in this manner, these valves are considered sealed closed isolation valves. When access to the containment is desired and the Plant is in the cold shutdown or the refueling mode, the purge fan, if required, is started and the isolation valve opened. If a high containment radiation level is detected, the containment air purge supply and exhaust valves, 2-AC-4, 2-AC-5, 2-AC-6 and 2-AC-7, receive a signal to close (FSAR Subsection 7.3.2.2.c). However, automatic isolation of the purge valves is not credited in the fuel handling accident analyses.

9.9.2.3.1 Normal Operation

The purge system is initiated manually in the control room by operator action. Hand switches are provided to start the fan and open isolation valves and dampers. The third main exhaust fan (Section 9.9.9) is started to exhaust the containment through particulate and high efficiency particulate air (HEPA) filters (Subsection 9.9.9.2.2). The system performance is monitored by containment temperature indication (Section 7.5). Air is supplied in the containment above the operating floor. Mixing is provided by the containment air recirculation and cooling system (Section 6.5) throughout the lower elevations of the containment. Mixing is provided throughout the upper regions of the containment by the containment auxiliary circulation system (Section 9.9.3). The containment ambient conditions during shutdown are described in Subsection 6.5.3.4.

Outside air is filtered prior to distribution within the containment. A steam heating coil is provided for tempering the outside air when required. During summer conditions, the outside air is supplied at approximately 86°F. During winter conditions, the outside air is tempered and supplied at 70°F.

Radioactive effluents released to the site boundary resulting from the containment purge operations are described in the Environmental Report.

The containment isolation valves on the purge system are locked closed and electrically disconnected during all modes of operation except cold shutdown and refueling. However, following a Containment Isolation Actuation Signal (CIAS) the supply fan, if operating, and associated isolation damper, if open, are isolated.

Damper closing is monitored by position indication in the control room.

The enclosure building is heated or ventilated when required by the purge system. Branch ducting is provided from the main purge line for the enclosure building. Ventilation may be required for this area periodically throughout the summer to maintain the enclosure building temperature below 120°F. Auxiliary heating, in addition to unit heater, may be required periodically through the summer to the winter to maintain the enclosure building temperature above 70°F. Unit heaters are located near Elevation 48-6 to maintain the lower regions of the enclosure building at 70°F. The upper regions in the enclosure building are maintained at 55°F minimum. Ventilation and auxiliary heating in the enclosure building is an operator option for personnel comfort and not essential for unit operation.

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9.9.7.4.2 Tests and Inspection

One of the two vaneaxial fans is rated in accordance with AMCA Standard 211-A. The water cooling coils are tested in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and TEMA, Class R. The ductwork is designed and fabricated in accordance with SMACNA Standard, "High Velocity Duct Construction Standards."

Provisions are incorporated into the system design for on-line testing capabilities. Each ESFRARS subsystem is tested separately from the redundant subsystem. The ESFRARS is automatically started by manually initiating the SIAS. Fan operation is indicated by motor trip alarms.

The ESFRARS undergoes a preoperational test prior to startup. The test procedure is discussed in Chapter 13.

The components of the ESFRARS are accessible for periodic inspection and maintenance.

9.9.8 Fuel Handling Area Ventilation System

9.9.8.1 Design Bases

9.9.8.1.1 Functional Requirements

The fuel handling area ventilation system is a Non-QA system, consisting of supply fan F-20 in combination with the main exhaust fans F-34A/B/C and a recirculating fan F-140 (coil X-191). It functions to provide a suitable environment for the equipment and fresh air ventilation for personnel within the fuel handling area of the auxiliary building. The fuel handling area consists of the open area at elevation 38'6", the mezzanine on the East side, and the open lower area known as the truck bay area.

9.9.8.1.2 Design Criteria

The following criteria have been used in the design of the fuel handling ventilation system:

a. The system is designed to permit periodic inspection of important components, such as fan, motor, belt, oil, filters, ductwork, piping and valves, to assure the integrity and capability of the system.

b. The components of the fuel handling ventilation system are designed to operate in the environment to which exposed.

c. The fuel handling area which is part of the auxiliary building shall be served by a separate ventilation system.

d. The fuel handling area shall be maintained at a slightly negative pressure.

9.9.8.2. System Description

9.9.8.2.1 System

The fuel handling area ventilation system is shown schematically in Figure 9.9-3.

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The fuel handling area ventilation system is designed to provide adequate ventilation in the spent fuel pool area and to prevent cross contamination with surrounding areas. The maximum design temperature in the fuel handling area is 110°F, and the minimum temperature maintained at 55°F, which is consistent throughout the plant for unmanned areas. However, booster coils are provided to maintain a desired temperature of 70°F for personnel comfort (e.g. dressing area).

The fuel handling ventilation system consists of a supply fan, F-20, providing 100 percent outside fresh air, tempered through a steam coil, to the spent fuel area at elevation 38'6".

A self contained air conditioning unit F-140 (coil X-191), located in the spent fuel pool area, provides cooling whenever operations in the spent fuel pool area are required during extreme warm weather. The air conditioner discharges through ductwork along the south wall of the spent fuel pool. The ductwork has been sized to accommodate a second air conditioning unit of similar size.

The air is drawn through return registers located on the north side wall, immediately above the spent fuel pool, to ensure that the negative pressure within the fuel handling area of the auxiliary building is at its strongest across the spent fuel pool surface area where the radioactive gaseous release is most likely to occur. The air is exhausted at a greater rate than it is supplied to ensure an overall negative pressure within the fuel handling area of the auxiliary building.

During normal operation, air is drawn by the main exhaust fans F-34/A/B/C through HEPA filter unit L-27. Prior to the handling of irradiated fuel, the exhaust air control logic ~~is~~ may be aligned to the auxiliary exhaust system (AES).

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Prior to the handling of irradiated fuel, the exhaust air is diverted from the main exhaust system to the auxiliary exhaust system (AES) by manual alignment of the system. This alignment includes verifying fuel handling area boundary doors are closed and capable of auto-closure, verifying the auxiliary building floor plugs are installed, and tagging closed 2-HV-171. Closing the cover on the auxiliary building elevator shaft smoke hole is not required. Therefore, in the event of a fuel accident in the spent fuel pool area which results
in a release of radioactivity, the AES will be maintaining a negative pressure within the fuel handling building and channeling the radioactive gaseous release through equipment which will result in accident doses at the site boundary well within the 10 CFR Part 100 guidelines.

As discussed in the Millstone Unit 2 Environmental Report and FSAR Section 14.7, an accident is not credible unless fuel is being handled or a heavy object has been moved over the spent fuel pool.

Technical Specifications require the AES to be operating when irradiated fuel is being handled or a shielded cask is being moved over the spent fuel pool. Prior to refueling operations, the AES is tested for automatic and remote manual initiation.

The radiation monitoring system consists of four (4) gamma sensitive plastic scintillation, detector assemblies equally spaced above the spent fuel pool area with local indication plus visual and audible alarms.

in the fuel handling area

Alarm circuitry of the readout module located in the control room will provide contact closure (2/4 matrix) upon high radiation for automatic operation of the auxiliary exhaust system. The automatic operation of the auxiliary exhaust system is not credited in the fuel handling accident analysis.
Alarm set points are adjustable and are normally set for 50 mr/hr.

9.9.8.2.2 Components

The major system components and associated fabrication and performance data are listed in Table 9.9-9. The fan performance curve is shown in Figure 9.9-16. The EBFS is described in Section 6.7.

9.9.8.3 System Operation

The fuel handling area ventilation is ~~required~~ Available during normal and shutdown operations.

9.9.8.3.1 Normal Operation

The fuel handling area ventilation system is manually started from the control room. The system logic requires one main exhaust fan (Subsection 9.9.9) to be operating prior to initiation of the supply fan (F-20).

During normal operation, it may be necessary to move heavy equipment over the spent fuel pool (i.e. moving fuel assembly, fuel cask), in which case the AES may be manually initiated. Manual initiation of AES is not credited in the fuel handling accident analyses.

The supply fan F-20 distributes fresh outside air to the operating floor level at elevation 38'6". A steam heating coil is provided for tempering outside air when required. A flow switch is provided on the supply unit discharge to monitor air flow and alarm flow conditions.

Outdoor air is supplied at approximately 86°F during summer operation to limit the fuel handling area maximum temperature to 110°F. During winter operation, the air is tempered to maintain a temperature at 55°F, which is consistent throughout the plant for unmanned areas. However, supplemental building heat is provided by steam unit heaters to maintain a desired temperature of 70°F for personnel comfort (e.g. dressing area).

During normal operation, air is pulled across the spent fuel pool surface by the main exhaust fans F-34A/B/C (Subsection 9.9.9) through the HEPA filter unit (L-27) prior to discharge to the Unit 2 stack. The effluent is monitored for radiation (Subsection 7.5.6).

The air conditioning unit F-140 is manually started and stopped locally as required by the operator to maintain comfortable conditions for the personnel working in the area.

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9.9.8.3.2 Emergency Operations

Ventilation is placed in the AES mode prior to moving irradiated fuel which has decayed less than 60 days or moving a shielded cask over the pool. The auxiliary exhaust actuation signal (AEAS) (Subsection 7.3) is automatically initiated by 2-out-of-4 high radiation logic. The AEAS isolates the fuel handling exhaust plenum to the main exhaust fans F-34A/B/C while aligning the fuel handling exhaust plenum to the Enclosure Building Filtration System (EBFS) fans F-25A & F-25B. Simultaneously, the AEAS also deenergizes

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supply fan F-20, isolates the Enclosure Building Filtration Region (EBFR) from the spent fuel pool area and initiates the EBFS fans. These actions ensure an overall negative pressure within the fuel handling area of the auxiliary building while creating an air flow path in the direction of the spent fuel pool and maintaining the strongest negative pressure over the spent fuel pool surface, where the radioactive gaseous release is likely to occur. The EBFS fans, F-25A/B, draw the exhaust air through their respective HEPA/Charcoal filter unit (L-29A/B) before discharging into Millstone stack. Bypass leakage from the 00-63
spent fuel pool area through the Auxiliary Building elevator shaft smoke hole to the Auxiliary Building will discharge via the Unit 2 stack. The AES ensures that the fuel handling ~~accident~~ doses at the site boundary are well within the 10CFR Part 100 Guidelines.

The exhaust ductwork from the fuel handling areas to the connection to the EBFS is designed to seismic Class 1 requirements. The exhaust ductwork is provided with sets of two dampers in a series arrangement. The main exhaust ductwork has two motor operated dampers (2-HV-170 & 171) in series. The AES ductwork has a set of dampers in series for each EBFS fan. EBFS fan F-25A has a motor operated damper, 2-EB-60, and an air operated damper, 2-EB-51, in series; EBFS fan, F-25B, has a motor operated damper, 2-EB-61, and an air operated damper, 2-EB-41, in series. These motor operated dampers are each powered by a separate emergency source. Following a fuel accident in the fuel handling area, the AEAS opens the isolation dampers connecting the exhaust ductwork to the EBFS suction and closes the isolation dampers which connect the ductwork to the normal exhaust fans F-34A/B/C.

To ensure that the potentially radioactive gaseous release is contained within the fuel handling area during a fuel handling accident, the ventilation system is designed to direct air flow toward the spent fuel pool and across its surface toward the exhaust registers. Although the air flow pattern may be mixed at the boundaries with other areas of the auxiliary building, the overall air flow pattern consists of 100 percent induced air flowing toward the spent fuel pool area since the supply fan F-20 is deenergized.

9.9.8.4 Availability and Reliability

9.9.8.4.1 Special Features

During normal plant operation, to assure a negative pressure within the fuel handling area of the auxiliary building, the supply fan F-20 can be started only if one main exhaust fan F-34A/B/C (Subsection 9.9.9) is operating. Upon a loss of the supply fan F-20, ventilation is still maintained, although at a lower rate by infiltration induced by an increased negative pressure generated by main exhaust fans. However, the supply fan F-20, is returned to service as soon as practicable.

Upon the loss of all three main exhaust fans F-34A/B/C, a main exhaust duct pressure switch trips-off supply fan F-20.

Round ductwork is provided for additional strength for the AES. Generally, if space permits, round ductwork is provided for seismic Class 1 requirements. This facilitates seismic analysis of the system. The components of the EBFS are described in Subsection 6.7.

All components of the normal fuel handling ventilation system are designed to operate in an environment of 110°F, atmospheric pressure and 100 percent relative humidity.

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9.9.8.4.2 Tests and Inspection

The centrifugal fans are similar to fans which are rated in accordance with AMCA Standard 211-A. The steam heating coils are tested in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and TEMA, Class C. The ductwork is designed and fabricated in accordance with SMACNA Standard, "High Velocity Duct Construction Standards."

The normal ventilation system undergoes an acceptance test prior to startup, while the AES undergoes a preoperational test. The test procedure is described in Chapter 13.

The AES is incorporated with provisions for online testing. The AES is manually initiated in the control room by operator action. The EBFS is automatically isolated from the EBFR and aligned with the fuel handling area. The normal ventilation is isolated from the fuel handling building.

System operation is monitored by flow and filter differential pressure indication. Damper opening and system alignment is monitored by positioned indication in the control room.

The components of the fuel handling ventilation system are accessible for periodic inspection and maintenance.

9.9.9 Main Exhaust Ventilation System

9.9.9.1 Design Bases

9.9.9.1.1 Functional Requirements

The main exhaust ventilation system is a Non-QA system, consisting of exhaust fans F-34A/B/C. It functions to filter the exhaust from all potentially radioactive areas of the unit.

9.9.9.1.2 Design Criteria

The following criteria have been used in the design of the main exhaust system:

a. The system shall be designed to permit periodic inspection of important components, such as fan, motor, belt, coil, filters, ductwork, piping and valves, to assure the integrity and capability of the system.

b. The components of the main exhaust system are designed to operate in the environment to which exposed.

c. The potentially radioactive areas of the auxiliary building shall be served by a separate ventilation system from the clean areas.

d. The potentially radioactive areas of the auxiliary building shall be maintained at a negative pressure in respect to the clean areas.

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9.9.9.2 System Description

9.9.9.2.1 System

The main exhaust system is shown schematically in Figures 9.9-1 and 9.9-2.

The main exhaust ventilation system is a Non-QA system and is designed to exhaust air from the areas of the auxiliary building served by the radwaste supply fan F-16, the spent fuel handling area supply fan, F-20 and the containment/enclosure building purge fan, F-23. Exhaust air from these areas is processed through HEPA filter units prior to discharge through the unit 2 stack.

The main exhaust ventilation system consists of three filter units (L-25, L-26, L-27), three centrifugal fans F-34A/B/C, and a pressure relief damper 2-AC-59. Each filter unit is associated with a respective area and is designed for the full system flow. Each main exhaust fan is sized for 32,000 cfm. However, during start-up it was accepted that the exhaust fans could not generate the design flow and consequently, supply fans F-16, F-20, F-23 serving the areas covered by the main exhaust fans are balanced to assure that the exhaust air flow is greater than the supply air flow to maintain a negative pressure in these areas. Normally, two fans are required for the radwaste and fuel handling areas with the third fan on standby. During purging operations or enclosure building ventilation, all three exhaust fans are operating.

9.9.9.2.2 Components

The major system components and associated fabrication and performance data are listed in Table 9.9-10. Fan performance curve is shown in Figure 9.9-18.

9.9.9.3 System Operation

The main exhaust ventilation system is required during normal and shutdown operations.

9.9.9.3.1 Normal Operation

The main exhaust ventilation system is manually started from the control room. Normally two of the three fans, F-34A/B/C are initiated for normal operation. Three fans are required to operate during purging or enclosure building ventilation operations. The third fan serves as backup for the two operating and provides redundancy in system design.

Air is exhausted from the respective areas in the auxiliary building at a greater rate than it is supplied to induce a negative pressure in these areas. The exhaust air is processed through the respective HEPA filter unit to remove airborne particulate matter. The exhaust duct from each of the three areas is provided with process radiation monitors (Subsection 7.5.6) to alarm high radiation levels.

Flow switches are provided at each fan discharge to alarm low flow conditions. A counterweight backdraft damper is provided at each exhaust fan discharge to minimize recirculation through an idle fan. The damper position for the air pressure damper 2-AC-59, and for each HEPA filter unit (L-25, L-26, L-27) isolation damper, is monitored in the control room.

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9.9.9.4 Availability and Reliability

9.9.9.4.1 Special Features

Two of the three main exhaust fans F-34A/B/C are required for normal operation. Although purging containment or enclosure building ventilation requires the third fan, this operation is discontinued upon the loss of any exhaust fans. Purging is not essential for unit operation or for shutdown and can be discontinued at any time to assure availability of exhaust fans for the auxiliary building.

Provisions for outside makeup air are provided through damper 2-AC-59 to act as a pressure relief damper whenever the pressure in the main exhaust duct exceeds a preset limit switch (automatic function) and to act as a flow balancing damper whenever an auxiliary building HEPA filter unit L-26/L-27 is taken out of service for maintenance, testing or filter replacement. Outside air is available at a maximum rate of 20,000 cfm (automatic function) to prevent the main exhaust plenum from exceeding its design negative pressure of (-) 6 in wg. By procedure, a manual function, whenever the radwaste ventilation system HEPA filter unit, L-26 is isolated supply fan F-16 is taken out of service, only one exhaust fan is allowed to operate and the makeup air damper 2-AC-59 is manually controlled to open at its minimum flow. This operation is necessary because one exhaust fan's capacity exceeds the spent fuel handling fan, F-20, rated at approximately 20,000 cfm. The minimum flow is preset to match the actual exhaust fan capacity with the actual fuel handling HEPA filter L-27 rated flow to maintain approximately the same negative pressure within the fuel handling area.

All the MES fans will trip on receipt of a Channel 1 CIAS actuation signal. This trip signal can be overridden to restart the fans to restore the ventilation if a CIAS signal is still present. This trip signal is not a credited engineered safety feature (ESF) equipment actuation. The trip will minimize the consequence of the single failure of dampers 2-AC-11 (Section 6.7.4.1.2).

By procedure, with the fuel handling HEPA filter unit L-27 out of service, supply fan F-20 is deenergized, makeup damper 2-AC-59 is opened to its maximum setting providing approximately 20,000 cfm and two main exhaust fans are activated. The maximum makeup flow is preset to match the actual exhaust fans capacity with the actual radwaste HEPA filter L-26 rated flow to maintain approximately the same negative pressure within the radwaste areas of the auxiliary building.

Outside makeup air capabilities are not required for the purge exhaust scenario since the requirements for the HEPA filter unit L-25 are within one exhaust fan capacity.

Each ventilation filter unit is provided with a differential pressure control damper to maintain a constant pressure drop across each unit as the filters get dirty. This provides the means to balance air flow for operations among parallel HEPA filter units L-25, L-26 and L-27.

To assure a negative pressure within the auxiliary building, the main exhaust fans must be started prior to starting any of the supply fans F-16, F-20, or F-23. The exhaust fans can maintain the specific area negative pressure upon the loss of its respective supply fan. However, upon the loss of one or more main exhaust fans F-34A/B/C, supply fans F-16, F-20 and F-23 will trip-off based on their respective pressure switches related setting.

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The discharge duct from the non-safety related Chemistry Laboratory Exhaust Ventilation Fans, F-165 and F-166 is connected to the inlet plenum of Main Exhaust Fans F-34A/B/C. This duct is equipped with an air operated isolation damper, 2-HV-710, which is controlled by a solenoid valve designed to close the damper when a low or no flow condition exists in the plenum. The damper also closes on loss of instrument air. 00-65

All components of the main exhaust ventilation system are designed to operate in an environment of 110°F, atmospheric pressure, and 100 percent relative humidity.

9.9.9.4.2 Tests and Inspections

The centrifugal fans are similar to fans which are rated in accordance with AMCA Standard 211-A. The ductwork is designed and fabricated in accordance with SMACNA Standard, "High Velocity Duct Construction Standards."

The HEPA filters are periodically tested in accordance with Regulatory Guide 1.140 and ANSI N510-1975, Testing of Nuclear Air-Cleaning Systems.

The main exhaust system undergoes an acceptance test prior to startup. The test procedure is described in Chapter 13.

All components of the main exhaust system located outside the containment are accessible for inspection and maintenance. Components within containment are accessible only during shutdown.

9.9.10 Control Room Air Conditioning System

9.9.10.1 Design Bases

9.9.10.1.1 Functional Requirements

The control room air conditioning system functions to maintain a suitable environment for personnel and for safety-related control and electrical equipment.

9.9.10.1.2 Design Criteria

The following criteria have been used in the design of the control room air conditioning system:

a. The system shall have two redundant, independent subsystems, each having 100 percent of the total required heat removal capability. However, there are some common supply and return ductwork and dampers.

b. The system shall have suitable subsystem and component alignments to assure operation of the complete subsystem with its associated components.

c. Capabilities shall be provided to assure system operation with either onsite power (assuming offsite power is not available) or with offsite electrical power.

d. A single failure in either subsystem shall not affect the functional capability of the other subsystem.

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e. The system shall be designed to permit periodic inspection of important components, such as fans, motors, coils, compressor, filters, piping, valves, instrumentation and ductwork, to assure the integrity and capability of the system.

f. The control room air conditioning system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leak-tight integrity of its components; (2) the operability and performance of the active components of the system; and (3) the operability of the system as a whole. Under conditions as close to the design as practical, performance shall be demonstrated of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, and the transfer between normal and emergency power sources.

g. The system shall be designed to the general criteria as described in Section 6.1.

h. The components of the control room air conditioning system shall be designed to operate in the most severe post-accident environment in which exposed.

i. Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposure in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident.

9.9.10.2 System Description

9.9.10.2.1 System

The control room air conditioning system is shown schematically in Figure 9.9-4A.

The control room air conditioning system consists of two full capacity, completely independent air handling and mechanical refrigeration subsystems with the exception of some common ductwork and dampers. Each control room air conditioning subsystem is a single zone system. The system has the capability of ventilating with outside air while cooling, using mechanical refrigeration.

Each subsystem is provided with a bypass through the control room filtration system (CRFS) consisting of particulate, HEPA and charcoal filters and fan. The physical properties of the CRFS charcoal filters are listed in Table 9.9-11. Each CRFS unit is capable of filtering 2500 cfm of control room air or for an Emergency Fresh Air Intake Mode, to introduce an adequate supply of outside air into the system after filtering.

Outside air is not provided for pressurizing the control room because of the potential radioactivity during the post-accident condition. Outside makeup air is avoided to minimize possibilities of inducing contamination into the control room. Outside air is introduced over the long term post-accident case only to provide fresh air for personnel safety.

Control room pressure is maintained at a relatively neutral pressure during normal plant operations by air balancing the HVAC system. When the HVAC system is in recirculation mode (accident condition), the control room in-leakage rate is limited by Technical

Specification limits.

The control room air conditioning system is designed to maintain a suitable environment in the control room for operating personnel and safety related control equipment. The control room is maintained at 78°F in the summer and 72°F in the winter.

The control room air conditioning system is equipped with full-capacity redundant fans, filters, and mechanical refrigeration equipment, plus the necessary dampers and controls for automatically switching to full recirculation for post-accident operation. The control room area system performance is continually monitored with alarms for high radiation, fan failure and excessive pressure drop through filters. The control room operator has remote, manual control for selecting damper position, backup fan and filter operation to ensure satisfactory control room conditions following an accident.

The dose in the Unit 2 control room, resulting from a Design Basis Accident (DBA), has been determined as follows. The fission product release model given in TID-14844 is assumed. All activity is assumed to be in the containment atmosphere. The dose to operating personnel in the control room due to inhalation of radioactivity following a LOCA is described in Section ~~14.18.3.3.~~ 14.8.4

Airborne radiation in the control room is negligible since any leakage out of the containment is into the enclosure building filtration region (Section 6.7) where it is filtered by charcoal filters and released through the Millstone stack. In addition, the control room is provided with an air conditioning system which may be operated in a closed, complete recirculation mode with provisions for filtering through charcoal filters following a high radiation level. 00-63

9.9.10.2.2 Components

The major system components and associated fabrication and performance data are listed in Table 9.9-11. Fan performance curves are shown in Figures 9.9-19 through 9.9-22.

Figure 9.9-4 indicates that a fan unit has been provided between the supply plenum and the control room (coordinates A-8). This blower is part of the process radiation monitor for the supply air duct. This is not part of the process air conditioning system.

9.9.10.3 System Operation

9.9.10.3.1 Normal Operation

The control room air conditioning system operates during all modes of operation and shutdown. The flow rate associated with normal operation of the control room air conditioning system is given in Table 9.9-11. The normal flow rate is approximately 14,800 cfm.

One hand switch starts the supply air handling unit, opens the outside air dampers and places the temperature control system in control of system operation. A second handswitch starts the exhaust fan and opens the associated isolation damper. The temperature control system satisfies the room cooling requirements by providing mechanical refrigeration. System operation is monitored by temperature indication on the control panel. Outside air, mixture air, supply air and room air are indicated. System alignment is monitored by valve position indication on the control boards. Flow balance

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alignment is monitored by valve position indication on the control boards. Flow balance and neutral pressure is maintained by directing some flow to the cable unit, equivalent to the fresh air intake.

Smoke detectors are provided in the return ductwork to automatically isolate the supply unit and initiate purging operations. The control room is purged by operating the exhaust fans and discharging to atmosphere. Discharge dampers to other areas are automatically closed. Both control room air conditioning subsystems are served by the smoke detection system. Fire dampers are provided at all ductwork penetrations through firewalls.

9.9.10.3.2 Emergency Operation

Normally, the method of conditioning the air is controlled by the automatic temperature control system. In the event of a LOCA emergency safeguards system generates an EBFAS, which automatically shifts the control room air conditioning system to a complete recirculation mode of operation in which outside air is not introduced into the system and all outside air dampers are closed. In addition, in the event of a fuel handling accident in the Spent Fuel Pool area, an AEAS is generated which automatically shifts the system to the complete recirculation mode. The automatic control system is capable of cooling using the mechanical refrigeration. Portions of the system air or outside air, can be manually bypassed through the CRFS charcoal filters for cleanup prior to supplying air into the conditioned space. The smoke detection system is overridden by the complete recirculation mode of operation to prevent malfunctions during post-accident conditions.
The analysis does not credit AEAS or EBFS during a fuel handling or cask drop accident.
System operation is monitored by temperature indication. Process and area radiation monitors are provided in the room supply air duct and control room to indicate and alarm high radiation levels. Operation of the CRFS is monitored by filter bank differential pressure and temperature indication. Fan operation is monitored by motor trip alarms.

In the event of a LOCA or a fuel handling accident, the control room air conditioning system is automatically switched to the isolation/ recirculation mode. Tests show that the unfiltered in-leakage is less than 130 scfm.

A fresh air make-up system will not be used to maintain a positive pressure differential with respect to the external environment or the adjacent internal spaces at any time during the normal or emergency modes of operation.

The control room air conditioning system mode of operation includes an automatic isolation of the system to the complete recirculation mode and automatic initiation of the bypass filtering operation. This automatic switchover to the complete recirculation mode and filtering mode is initiated by the EBFAS or the AEAS.

The post-accident mode of operation is a closed cycle with air intakes and outlets isolated. The control room atmosphere is exhausted from the space, filtered, and cooled as required and returned to the space. Outside air is not introduced into the system unless required for personnel safety.

9.9.10.4 Availability and Reliability

9.9.10.4.1 Special Features

The components of the control room air conditioning system are designed to engineered

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safety feature requirements including seismic response as described in Section 6.1. All components are protected from missile damage and pipe whip by physical separation of duplicate equipment, as described in Section 6.1.

Each air conditioning subsystem is capable of maintaining a suitable environment within the control room. Each system is designed for the normal control room cooling load which is greater than the cooling requirements under post-accident operation. Each system is completely independent, including the control and filtration systems with the exception of some common ductwork and dampers. Common components such as dampers are isolated during post-accident operation. Control inputs to these devices are overridden. Each subsystem is powered by a separate emergency source (Section 8.3). A failure mode analysis for the control room air conditioning system is given in Table 9.9-17. Although there are common plenums, all ductwork is considered a passive component not subject to a single failure mode.

The charcoal filter elements within the CRFS are analyzed to ensure adequate residual heat removal capabilities following any single failure. The analysis concludes that the maximum temperature calculated, based on a radioactive filter inventory which was conservatively assumed to be ten (10) times greater than the maximum inventory calculated resulting from a design basis accident at the site, was less than 212°F (100°C). This is substantially below the charcoal ignition temperature, thus filter bed isolation should not constitute a fire hazard. Temperature indication is provided to alert personnel of excessive charcoal bed temperature.

All control room air conditioning system fans and filters are remote from the control area and are not exposed to fire hazards. The atmosphere within the control room is maintained as constant as possible during the post-accident recirculation mode.

Isolation dampers are provided at each fan discharge to prevent short circuiting of air through idle units.

Snow screens are located on the roof around the Control Room Make-up Inlet Housing, the Control Room Condenser Fan Housings F-36A and F-36B, and the Control Room Exhaust Housing.

The shielding design limits dose rates in the control room to less than 0.5 mrem/hr and does not exceed 5 rem for the duration of the DBA.

All components of the control room air conditioning system located outside the conditioned space are designed to operate in an environment of 110°F atmospheric pressure and 100 percent relative humidity. Typically, safety related components within the conditioned space are designed to operate in an environment of 104°F (40°C) and 10 to 95 percent relative humidity.

9.9.10.4.2 Tests and Inspection

The centrifugal and vaneaxial fans are similar to fans which are rated in accordance with AMCA Standard 211A. The condenser and compressor are rated in accordance with Air Conditioning and Refrigeration Institute (ARI) Standard 410-64 and 520-68, respectively. The evaporator coils are rated in accordance with American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 33-64. Refrigeration equipment is manufactured in accordance with ANSI B9.1, Safety Code for Mechanical

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Refrigeration. Refrigeration piping is designed, fabricated and tested in accordance with ANSI B31, 5-1966, Refrigeration Piping Systems. Filters are described in Subsection 6.7.4.2.

The ductwork is designed and fabricated in accordance with SMACNA Standard, "Low Velocity Duct Construction Standards."

The control room air conditioning system is incorporated with provisions for on-line testing. Each subsystem is tested independently for operation of associated components. The subsystem in operation is tested by manually switching to the complete recirculation mode. System alignment and valve positions are monitored in the control room by position indication while system performance is monitored by temperature indication. The associated filtration system is manually initiated for alignment with the control room by-passed air and for fresh outside air. System alignment and valve position are monitored in the control room by position indication.

The redundant air conditioning subsystems are operated alternately to provide assurance of operability.

The control room air conditioning system undergoes a preoperational test prior to startup. The procedure is described in Chapter 13.

All components of the control room air conditioning system are accessible for periodic inspection and maintenance.

9.9.11 Diesel Generator Ventilation Systems

9.9.11.1 Design Bases

9.9.11.1.1 Functional Requirements

The normal diesel generator room ventilation system (Fan F-27) functions to maintain a suitable environment for equipment and plant operating personnel during normal operation and shutdown conditions. The emergency diesel generator ventilation (DGV) system (Fan F-38A/F-38B) functions to maintain a suitable environment for equipment during emergency conditions.

9.9.11.1.2 Design Criteria

The following criteria have been used in the design of the diesel generator room ventilation system:

a. The system shall be designed to permit periodic inspection of important components, such as fan, motor, belt, coil, and ductwork, to assure the integrity and capability of the system.

b. The components of the system shall be designed to operate in the environment to which exposed.

The following criteria have been used in the design of the emergency DGV system:

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AIRBORNE ACTIVITY SAMPLING SYSTEM FOR CONTAINMENT, SPENT FUEL AND RADWASTE ATMOSPHERES

In-plant control of personnel exposure from airborne radioactivity will be effected by a continuing program of sampling for airborne activity and administrative controls through radiation work permits.

(1) Containment atmosphere is continuously monitored from the suction of the auxiliary recirculation fans. The sample is pulled through a fixed particulate filter, a charcoal cartridge and a gas chamber before being pumped back to the containment. Particulate activity is measured by a beta scintillator through a derivative (rate of change) circuit. Any rapid changes in beta activity will be alarmed in the control room. The particulate filters are changed on a routine schedule to maintain maximum sensitivity. Gaseous iodine is absorbed on the charcoal cartridge. Routine replacement of the cartridge for counting in accordance with approved station procedures will ensure adequate surveillance. Gaseous activity is measured with a 4 pi beta, gamma geiger muller detector chamber. Increased activity above pre-set levels will alarm in the control room. 98-128 8/98

Upon indication of a significant increase in activity in the containment building, the Shift Supervisor will notify health physics. The particulate filter and charcoal cartridge will be changed and examined to determine the isotopes responsible for the increased activity. During power operation, if conditions warrant, health physics may enter the containment and take portable air samples in selected areas in order to locate the source of the activity. Appropriate respiratory equipment will be indicated on the radiation work permits. 98-128

During shutdown and maintenance conditions, air samples will be taken with the portable sampling equipment throughout the containment building on a scheduled basis and as required, to determine the presence of any unusual concentrations of airborne activity. Appropriate respiratory protection, if required, will be indicated on the radiation work permits.

While work is being performed on the reactor vessel head and there is a potential for release of airborne activity, continuous health physics monitoring of the work area will be in effect. This monitoring will consist of particulate and iodine sampling. Workers will be instructed to leave the area if they suspect any unusual problem. 98-128

The spent fuel pool exhaust monitor is a continuous sampling system that takes suction upstream to the HEPA filter. This sample passes through a particulate filter, charcoal cartridge and gaseous 4 pi beta, gamma detection chamber. The particulate filter and charcoal cartridge will be changed on a routine basis and counted. The gaseous channel is monitored and alarmed in the control room. An alarm condition will require notification of health physics to allow examination of the particulate and charcoal filters and initiate local air sampling to determine the source of the increased activity. Work area air sampling will be established 98-128 98-128 98-128

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consistent with spent fuel pool ventilation line up and work in progress. These samples will supplement the spent fuel pool exhaust monitor. 98-128 8/98

(2) Those areas with the highest potential for creating airborne activity are the solidification system and the sampling room. All other radwaste areas contain equipment that is closed and therefore of a low potential for creating airborne activity.

Portable continuous air monitors (CAM) will be available for use in the solidification area. Due to the nature of the ureaformaldehyde solidification system, all processing is done with liquid phases, except for cartridge type filters and spent resin casks. Therefore, the potential for creating airborne activity is extremely low. The CAM has an advantage over fixed monitoring equipment in that it can be used in other areas of the plant when solidification is not in progress.

98-128

The sampling room (primary sample sink area) has a separate ventilation system via the sample hood. The hood design is such that at least 100 linear feet per minute flow is maintained over the working area in the hood to ensure that there is no contamination or airborne activity spread into the sampling room. Visual indication is available to the personnel frequenting the sampling room to indicate the condition of the exhaust system. A shutdown exhaust system would require health physics evaluation of airborne conditions prior to entry. 98-128 98-128

(3) The radwaste airborne radioactivity monitoring system consists of four radiation monitors, each capable of continuously monitoring airborne radioactive particulates. In addition, each monitor contains an iodine sampling assembly consisting of a replaceable charcoal cartridge mounted in series and downstream of the particulate monitor. The charcoal cartridge will be removed periodically, for analysis of iodine activity. 98-128

Since the waste gas system of the radwaste areas has the potential for the release of gaseous activity, the airborne radiation monitor sampling the ventilation exhaust duct servicing that area also contains a gaseous radioactivity monitor in series with the particulate and iodine monitor. The gaseous monitor will be used to detect and measure significant noble gas releases from the waste gas system.

Sampling for each monitor is accomplished by extracting a representative sample from the radwaste ventilation exhaust system by using an isokinetic nozzle designed in accordance with ANSI N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.

Since the airflow at each point selected represents the exhaust of several compartments, the effect of dilution on the compartment having the least flow was analyzed to demonstrate the capability of detection and measurement of airborne contaminants in the areas being served by that section of the ventilation exhaust system.

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For this analysis, a concentration of $3x10^{-9}$ microcuries per cubic centimeter was used. To determine the radioactive concentration at the sampling point, this value was multiplied by the ratio of the flow for the compartment having the lowest airflow to the total flow at the sample point.

Point A (RM-8999 P&ID 25203-26029)

The airflow at this sampling point is 15,495 scfm. The ventilation exhaust system at this point services the storage area, the offices, the heat exchanger pump area, the coolant waste tank areas, and the evaporator rooms.

The airflow for the compartment having the least flow exhausting into this section of the ventilation exhaust system is 800 scfm. Assuming the concentration of $3x10^{-9}$ microcuries per cubic centimeter exists in this room with the least flow, the radioactive concentration C_A at this point is: 99-49

$$C_A = 3x10^{-9}\ \mu Ci/cc\ \frac{800\ scfm}{15{,}495\ scfm}$$

$$= \underline{1.548 \times 10^{-10} \mu Ci/cc}$$

Manufacturer's data for the radiation monitoring equipment states that the monitoring equipment placed in a 1 mrem/hr background of 1 Mev gamma energies produces a count rate of 78 cpm. Concentrations of $1x10^{-11}\mu$Ci/cc (limiting isotope Cs-137) produces a count rate 107 cpm. Therefore, the count rate for the concentration at point A is equal to 1656 cpm.

Point B (RM-8998 P&ID 25203-26029)

The airflow at this sampling point is 18,335 scfm. The ventilation exhaust system at this point services the sampling room, the letdown heat exchanger room, the coolant waste receiver area, and the volume control tank area.

The airflow for the compartment having the least flow exhausting into this section of the ventilation exhaust system is 160 scfm. Assuming the value of $3x10^{-9}\mu$Ci/cc exists in this area, the radioactive concentration C_B at this point is:

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$$C_B = 3x10^{-9}\mu Ci/cc \left(\frac{160\ scfm}{18,335\ scfm}\right)$$

$$= \underline{2.61x10^{-11}\mu Ci/cc}$$

Assuming the 78 cpm for the background counting rate and the 107 cpm for the concentration $1x10^{-11}\mu Ci/cc$ (Cs-137), the count rate for point B is 279 cpm.

Point C (RM-8997 P&ID 25203-26029)

The airflow at this sampling point is 10,170 scfm. The ventilation exhaust system at this point services the charging pump areas, the degasifier areas, and the engineered safety features areas. The airflow for the compartment having the least flow exhausting into this section of the ventilation exhaust system is 235 scfm. Assuming the value of $3x10^{-9}$ microcuries per cubic centimeter exists in this area, the radioactive concentration C_C, at this point is: 98-128 8/98

$$C_C = 3x10^{-9}\mu Ci/cc \left(\frac{235\ scfm}{10,170\ scfm}\right)$$

$$= \underline{6.93\ x\ 10^{-11}\mu Ci/cc}$$

Assuming the 78 cpm for the background count rate and the 107 cpm for the concentration $1\ x\ 10^{-11}\mu Ci/cc$ (Cs-137), the count rate for the concentration at point C is 742 cpm.

Point D (RM-8434 A&B P&ID 25203-26029)

The air flow at this sampling point is 17,920 scfm. The ventilation system at this point services the equipment laydown area, the waste gas decay system areas, the aerated waste gas system area, and the RBCCW heat exchanger area. The airflow for the compartment having the least flow exhausting into this section of the ventilation exhaust system is 800 scfm. Assuming the value of $3x10^{-9}\mu Ci/cc$ exists in this area, the radioactive concentration, C_D, at this point D is: 98-128

$$C_D = 3x10^{-9}\mu Ci/cc \left(\frac{800\ scfm}{17,920\ scfm}\right)$$ 98-128

$$= \underline{1.34\ x\ 10^{-10}\mu Ci/cc}$$

Assuming the 78 cpm for the background count rate and 107 cpm for the concentration $1\ x\ 10^{-11}\mu Ci/cc$ (Cs-137), the count rate for the concentration at point D is 1434 cpm. 98-128

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The calculations and analysis for the four sampling points shown above indicate a count rate ranging from 279 counts per minute to 1656 counts per minute. Since these count rates are greater than three times the background rate, as specified by the manufacturer, the concentration shown in the above calculations can be detected and alarmed. 98-128 8/98

The above analysis is conservative in that the value used is based on an exposure to the concentrations specified for forty hours in any period of seven consecutive days. However, since the normal occupancy for these areas is significantly less than this 40 hour period, the exposure of personnel to airborne radioactivity will be considerably less than that stated in the above calculations. 98-128

In conclusion, the above analysis clearly demonstrates the capability of the airborne radiation monitoring system to detect and measure appropriate concentrations in the radwaste ventilation exhaust system and thus to comply with the requirements for personnel safety stated in 10 CFR 20.103 and 10 CFR 20.203(d). 98-128

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14.7.4 Radiological Consequences Of Fuel Handling Accident

14.7.4.1 General

The likelihood of a fuel handling accident is minimized by administrative controls and physical limitations imposed upon fuel handling operations. All refueling operations are conducted in accordance with prescribed procedures under direct surveillance of a qualified supervisor. Also, before any refueling operations begin, verification of complete control element assembly (CEA) insertion is obtained by tripping each CEA individually to obtain indication of assembly drop and disengagement from the drive shaft. Boron concentration in the coolant is raised to the refueling concentration of 1720 ppm boron, or more and is verified by chemical analysis. At a boron concentration of 1720 ppm, the core will be more than 9.5 percent subcritical, even with all CEA's withdrawn.

After the vessel head is removed, the CEA drive shafts are removed from their respective assemblies. A load cell is used to indicate that the drive shaft is free of the CEA as the lifting force is applied.

The maximum elevation to which the fuel assemblies can be raised is limited by the use of hard stops in the fuel handling hoists and manipulators to ensure that the minimum depth of water above the top of a fuel assembly required for shielding is always present. This constraint applies in fuel handling areas inside containment and in the spent fuel pool area. Supplementing the physical limits on fuel withdrawal, radiation monitors located at the fuel handling areas provide both audible and visual warning of high radiation levels in the event of a low water level in the refueling cavity or fuel pool. Fuel pool structural integrity is assured by designing the pool and the spent fuel storage racks as Seismic Class I structures.

The design of the spent fuel storage racks and handling facilities in both the containment and fuel storage area is such that fuel will always be in a subcritical geometrical array, assuming zero boron concentration in the fuel pool water. The spent fuel pool and refueling pool water contain a minimum of 800 ppm and 1720 ppm of boron, respectively. Natural convection of the surrounding water provides adequate cooling of fuel during handling and storage. Adequate cooling of the water is provided by forced circulation in the spent fuel pool cooling system. At no time during the transfer from the reactor core to the spent fuel storage rack is the spent fuel removed from the water.

Fuel failure during refueling as a result of inadvertent criticality or overheating is not possible. The possibility of damage to a fuel assembly as a consequence of mishandling is minimized by extensive personnel training, detailed procedures, and equipment design. Equipment design and administrative controls preclude the handling of heavy objects such as shipping casks over the spent fuel storage racks with the exception of the consolidated fuel storage box or any object bounded by the consolidated fuel storage box drop analysis. Inadvertent disengagement of a fuel assembly or consolidated fuel storage box from the fuel handling machine is prevented by mechanical interlocks. Consequently, the possibility of dropping either one and damaging of a fuel assembly is remote.

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If ventilation is available and boundary integrity is set –

Should a fuel assembly be dropped or otherwise damaged during handling, radioactive release could occur in either the containment or the auxiliary building. The ventilation exhaust air from both of these areas is monitored before release to the atmosphere (see Subsection 7.5.6.3). The radiation monitors immediately indicate the increased activity level and alarm. The affected area would then be evacuated. INSERT 5

Release of activity through the containment purge system would be ~~limited by~~ automatic closure of the containment isolation dampers as described in Subsection 9.9.2.2. The containment hatch is closed during fuel handling operations, and the personnel hatch will be closed within 10 minutes following a fuel handling accident.

Since the auxiliary building cannot be completely isolated, ~~this results in a more limiting~~ activity release to the environment. Prior to the handling of irradiated fuel, the exhaust air is diverted from the main exhaust system by being manually aligned to the auxiliary exhaust system (AES) and exhausted from the spent fuel pool area through the enclosure building filtration system (EBFS) charcoal filter to remove iodines (see Subsection 9.9.8) prior to release through the Millstone stack . 00-63

14.7.4.2 Method of Analysis

For the purpose of defining the upper limit on fuel damage as the result of a fuel handling accident, it is assumed that the fuel assembly or consolidated fuel storage box is dropped during handling. Interlocks, procedural and administrative controls make such an event unlikely. However, if an assembly is damaged to the extent that a number of fuel rods fail, the accumulated fission gases and iodines in the fuel element gap could be released to the surrounding water. Release of the fission products to the surrounding water is considered negligible as a result of reduced diffusion through the fuel due to the low fuel temperature during refueling.

The fuel assemblies and consolidated fuel storage box are stored within the spent fuel rack at the bottom of the spent fuel pool. The top of the rack extends above the top of the stored fuel. A dropped fuel assembly or consolidated fuel storage box could not strike more than one fuel assembly in the storage rack. Impact can occur only between the ends of the involved components, the bottom end fitting of the dropped components impacting against the top end fitting of the stored fuel assembly. The results of an analysis on the energy absorption capability of a fuel assembly indicate that a fuel assembly is capable of absorbing the kinetic energy of the fuel assembly or consolidated fuel storage box drop with no fuel rod failures. The worst fuel handling incident that could occur in the spent fuel pool is the dropping of a fuel assembly to the fuel pool floor. It is assumed all of the fuel rods within one fuel assembly will fail as a result of a fuel handling incident within containment or the spent fuel pool area.

All X/Q values have been chosen in the following manner: Site meteorological data has been examined for the years 1974, 1975, and 1976. For each release point and dose calculation time period in question, the year with the largest (most conservative) 95% maximum X/Q value has been chosen.

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~~For each accident, the results indicate that the radiological consequences are well within the guidelines specified in 10CFR100. Well within is defined in SRP 15.7.4 as less than 75 rem thyroid and less than 6 rem whole body. The radiological consequences are also less than the 5 rem whole body limits specified in GDC 19 for the control room .~~

14.7.4.2.1 Fuel Handling Accident in the Spent Fuel Pool

~~This accident has been reanalyzed using the assumptions contained in Regulatory Guide 1.25 and SRP 15.7.4. A complete list of assumptions is provided in Table 14.7.4-1. The results of this analysis, which are well within the limits of 10CFR100 and within the limits of GDC 19, are summarized in Section 14.7.4.3.1.~~

14.7.4.2.2 Fuel Handling Accident in Containment

~~A complete list of the assumptions used to determine these results is provided in Table 14.7.4-2. The results of the analysis, which are well within the limits of 10CFR100 and within the limits of GDC 19, are summarized in Section 14.7.4.3.2.~~

14.7.4.2.3 Fuel Handling Accident in the Spent Fuel Pool With 60 Day Decay

~~The fuel handling accident in the spent fuel pool was analyzed using fuel that has decayed for 60 days. This case analyzed a puff release out the Unit 2 Stack with no filtration and an assumption of 1 damaged fuel assembly. The assumptions in Table 14.7.4-3 were used. The results of this analysis, which are well within the guidelines of 10CFR100, are summarized in Section 14.7.4.3.3.~~

14.7.4.3 Results of Analysis

14.7.4.3.1 Fuel Handling Accident in the Spent Fuel Pool

	Thyroid, rem	Whole Body, rem	Skin, rem
EAB	5.13 E+00	9.22 E-02	N/A
LPZ	1.15 E+00	2.39 E-02	N/A
Control Room	1.96 E+01	7.33 E-02	2.27 E+00

14.7.4.3.2 Fuel Handling Accident in Containment

	Thyroid, rem	Whole Body, rem	Skin, rem
EAB	3.53 E+01	1.23 E-01	N/A
LPZ	4.63 E+00	1.61 E-02	N/A
Control Room	2.58 E+01	3.94 E-02	1.32 E+00

14.7.4.3.3 Fuel Handling Accident in the Spent Fuel Pool With 60 Day Decay

	Thyroid, rem	Whole Body, rem	Skin, rem
EAB	6.06 E-01	8.96 E-04	N/A
LPZ	7.95 E-02	1.18 E-04	N/A
Control Room	9.01 E+00	7.23 E-04	7.00 E-01

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14.7.4.4 Conclusions

The exclusion boundary doses resulting from a fuel handling accident are well within the guidelines of 10CFR Part 100 and within the limits of GDC 19. Thus, a dropped fuel assembly will not present any undue hazard to the health and safety of the public.

14.7.5 Spent Fuel Cask Drop Accidents

The dose impact of dropping a spent fuel cask in the spent fuel pool was determined based upon a rupture of a total of 1560 fuel assemblies. These fuel assemblies consist of 184 fuel assemblies decayed for 1 year and 688 consolidated fuel canisters decayed for 5 years. Each consolidated fuel canister contains the equivalent of two fuel assemblies. This evaluation bounds the dose consequences from the dropping of a consolidated fuel canister. The assumptions listed in Table 14.7.4-1 are applicable except for the number and age of ruptured fuel assemblies, as discussed above, and a peaking factor of 1 was used. The resulting dose consequences are:

	Thyroid, rem	Whole Body, rem	Skin, rem
EAB	1.62 E-03	1.26 E-01	N/A
LPZ	3.62 E-04	3.27 E-02	N/A
Control Room	4.75 E-01	3.25 E-01	2.51 E+01

These doses are well within the guidelines of 10CFR100 and within the limits of GDC 19.

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TABLE 14.7.4-1

ASSUMPTION FOR FUEL HANDLING ACCIDENT IN THE SPENT FUEL POOL

1)	Reactor Core Power Level:	2754 Mwt
2)	Iodine Pool Decontamination Factor:	~~100~~ 200
3)	Activity Released from Rods	
	a) Iodines:	~~12%~~ 8%
	b) Noble Gases ~~(Except KR-85)~~:	10%
	~~c) KR-85:~~	~~30%~~
4)	Chemical Form of Iodines Above Pool	
	a) organic:	~~25%~~ 43%
	b) ~~inorganic~~: Elemental	~~75%~~ 57%
5)	1 Assembly Assumed to Rupture	
6)	Peaking Factor:	1.83
7)	Decay Time:	72 hours
8)	EBFS Filter Efficiency	
	a) organic iodine:	70%
	b) inorganic iodine:	90%
8 ~~9)~~	~~Portion of Activity Instantaneously Released Through EBFS Filters to Millstone Stack:~~ Duration of Release	~~98%~~ 2 hours | 00-63
All 9 ~~10)~~	~~Portion of~~ Activity ~~That~~ Bypasses EBFS Filters and is ~~Instantaneously~~ Released at Ground Level: using worst case X/Qs	~~2%~~
11)	Millstone Stack χ/Q's (sec/m^3)	| 00-63
	a) EAB:	1.00E-04
	b) LPZ:	2.69E-05
	c) Control Room:	2.51E-04
10 ~~12)~~	Ground Level χ/Q's (sec/m^3)	
	a) EAB:	3.66E-04
	b) LPZ:	4.80E-05
	c) Control Room:	5.46E-03
11 ~~13)~~	~~Thyroid~~ Dose Conversion Factors	~~ICRP 30~~ FGR11 + 12
12 ~~14)~~	Breathing Rate (m^3/sec):	~~3.47E-04~~ 3.5E-04

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TABLE 14.7.4-2

ASSUMPTION FOR FUEL HANDLING ACCIDENT IN CONTAINMENT

1)	Reactor Core Power Level:		2754 Mwt
2)	Iodine Pool Decontamination Factor:		~~100~~ 200
3)	Activity Released from Rods		
	a)	Iodines:	~~12%~~ 8%
	b)	Noble Gases ~~(Except KR-85)~~:	10%
	~~c)~~	~~KR-85:~~	~~30%~~
4)	Chemical Form of Iodines Above Pool		
	a)	organic:	~~25%~~ 43%
	b)	~~inorganic:~~ elemental	~~75%~~ 57%
5)	1 Assembly Assumed to Rupture		
6)	Peaking Factor:		1.83
7)	Decay Time:		72 ~~150~~ hours
8)	~~Containment Mixing Prior to Release~~ Duration of Release		~~20%~~ 8 hours
9)	~~Activity Released From Purge to the MP-2 Stack~~ All activity bypasses filters and is released at ground level using worst case X/Q's		
~~10)~~	~~Release occurs for 10 minutes~~		
~~11)~~	~~Purge flow Rate:~~		~~32,000 CFM~~
10 ~~12)~~	~~MP-2 Stack~~ Ground Level χ/Q's (sec/m^3)		
	a)	EAB:	3.66E-04
	b)	LPZ:	4.80E-05
	c)	Control Room:	~~2.92~~ 5.46 E-03
11 ~~13)~~	~~Thyroid~~ Dose Conversion Factors		~~ICRP 30~~ FGR11 + 12
12 ~~14)~~	Breathing Rate (m^3/sec):		~~3.47~~ 3.5 E-04

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TABLE 14.7.4-3

ASSUMPTION FOR FUEL HANDLING ACCIDENT WITH FUEL DECAYED FOR 60 DAYS

1)	Reactor Core Power Level:		2754 Mwt
2)	Iodine Pool Decontamination Factor:		100
3)	Activity Released from Rods		
	a)	Iodines:	12%
	b)	Noble Gases (Except KR-85):	10%
	c)	KR-85:	30%
4)	Chemical Form of Iodines Above Pool		
	a)	organic:	25%
	b)	inorganic:	75%
5)	1 Assembly Assumed to Rupture		
6)	Peaking Factor:		1.83
7)	Decay Time:		60 Days
8)	No Filtration		
9)	Activity Instantaneously Released Through the MP-2 Stack		
10)	MP2 Stack χ/Q's (sec/m^3)		
	a)	EAB:	3.66E-04
	b)	LPZ:	4.80E-05
	c)	Control Room:	2.92E-03
11)	Thyroid Dose Conversion Factors		ICRP 30
12)	Breathing Rate (m^3/sec):		3.47E-04

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